

### TECHNICAL SUMMARY LECTURES

#### **TSL-Mo-a-1 Room 411+412**

Chair: HIGASHI Y. (*Iwaki Meisei University, Japan*)

#### **13:30 PIONEERING CHALLENGE ON THERMODYNAMIC PROPERTIES RESEARCH ON REFRIGERANTS**

WATANABE K.

*Professor Emeritus, Keio University, Japan*

#### **TSL-Mo-a-2 Room 411+412**

Chair: MIYARA A. (*Saga University, Japan*)

#### **14:30 IMPORTANCE OF SURFACE TENSION EFFECT IN ENHANCING CONDENSATION IN REFRIGERANT CONDENSERS**

HONDA H.

*Professor Emeritus, Kyushu University, Japan*

#### **TSL-Mo-a-3 Room 411+412**

Chair: FUKUTA M. (*Shizuoka University, Japan*)

#### **15:30 COMPRESSOR TECHNOLOGY FOR A/C AND REFRIGERATION SCROLL COMPRESSORS PAST, PRESENT AND FUTURE**

TOJO K.

*Professional Engineer, TOJO R&D Design Office  
Waseda University, Japan*

#### **TSL-Mo-a-4 Room 411+412**

Chair: SAITO K. (*Waseda University, Japan*)

#### **16:30 HEAT PUMP TECHNOLOGIES FOR A SUSTAINABLE SOCIETY**

KAWAI S.

*Professor Emeritus, Waseda University, Japan*

#### **TSL-Mo-b-1 Room 414+415**

Chair: TOGASHI E. (*Kogakuin University, Japan*)

#### **13:30 DESIGN OF SOLAR BUILDINGS – BASIC THEORY AND APPLICATION OF SOLAR HEATING AND COOLING SYSTEMS –**

UDAGAWA M.

*Professor Emeritus, Kogakuin University, Japan*

#### **TSL-Mo-b-2 Room 414+415**

Chair: MOTOMURA N. (*Toho University Sakura Medical Center, Japan*)

#### **14:30 CRYO-BIOLOGY AND -MEDICINE IN THE 21ST CENTURY**

SUMIDA S.

*Honorary Member, IIR and Fellow of the Society for Cryobiology  
Director, Dr. Sajio Sumida Clinic, Japan*

**TSL-Mo-b-3 Room 414+415**Chair: WATANABE M. (*Tokyo University of Marine Science and Technology, Japan*)

- 15:30 DEVELOPMENT OF QUALITY CONTROL TECHNOLOGIES BASED ON ICE CRYSTAL MORPHOLOGY FORMED IN FROZEN FOODS**  
 SAGARA Y.  
 FOOD KANSEI COMMUNICATIONS, CORP. (FKC)  
 Professor Emeritus, The University of Tokyo, Japan

**TSL-Mo-b-4 Room 414+415**Chair: YOKOI M. (*Taisei Corporation, Japan*)

- 16:30 CFD VISUALIZATION OF VENTILATION EFFECTIVENESS IN ROOM**  
 KATO S.  
 Professor, Institute of Industrial Science, The University of Tokyo, Japan

**TUESDAY, AUGUST 18 9:00-12:20****MAIN HALL**

- 9:00 OPENING CEREMONY**

- 10:50 PLENARY LECTURE**

Chair: SASAKI M. (*Tokyo Electric Power Company, Japan*)

**WORLD ENERGY SITUATION AND JAPAN'S ENERGY STRATEGY**  
 KOYAMA K.  
 Chief Economist and Managing Director, Institute of Energy Economics,  
 Japan

- 12:00 AWARD CEREMONY**

**TUESDAY, AUGUST 18 13:30-15:10****MEASUREMENT TECHNIQUES****B1-Tu-3a Room 301**Chairs: ASANO H. (*Kobe University, Japan*)FAVERO C. (*Parker Hannifin Manufacturing Srl, Italy*)

- 13:30 612 NEUTRON IMAGING CALIBRATION TO MEASURE VOID FRACTION**  
 GEOGHEGAN P., BILHEUX H., SHARMA V., FRICKE B.  
 Oak Ridge National Laboratory, United States

- 13:50 230 A NOVEL MEASUREMENT SYSTEM FOR DENSE FOAM USING A SINGLE-TIP OPTICAL FIBER PROBE**  
 NIHEI A. (\*), MIZUSHIMA Y. (\*\*), SAITO T. (\*\*\*)  
 (\*) Graduate School of Engineering, Shizuoka University, Japan, (\*\*) Graduate School of Science and Technology, Shizuoka University, Japan, (\*\*\*) Research Institute of Green Science and Technology, Shizuoka University, Japan

- 14:10 313 DETERMINATION OF THE ICE CONCENTRATION OF ICE SLURRIES USING IMPEDANCE MEASUREMENT**  
 T'JOLLYN I., DE KERPEL K., DE PAEPE M.  
 Ghent University, Belgium

- 14:30 267 QUALITY MEASUREMENT OF TWO-PHASE FLOW IN PLUG FLOW REGION**  
 SHINOHARA Y. (\*), FUKUTA M. (\*\*), MOTOZAWA M. (\*\*), NISHIKAWA M. (\*\*\*), KAWANO H. (\*\*\*), KOBAYASHI H. (\*\*\*)  
 (\*) Graduate School of Engineering, Shizuoka University, Japan, (\*\*) Shizuoka University, Japan, (\*\*\*) DENSO CORP., Japan

**CYCLE / SYSTEM ANALYSIS (1)****B1-Tu-3b Room 303**Chairs: BUTRYMOWICZ D. (*Bialystok University of Technology, Poland*)HWANG Y. (*University of Maryland, United States*)

- 13:30 97 APPLICABILITY OF GLOBAL TEMPERATURE CHANGE POTENTIAL (GTP) METRIC TO REPLACE GWP IN TEWI ENVIRONMENTAL ANALYSIS OF HEAT PUMP SYSTEMS**  
 MAKHNATCH P., KHODABANDEH R.  
 Royal Institute of Technology, Department of Energy Technology, Division of Applied Thermodynamics and Refrigeration, Sweden

- 13:50 607 FORTY YEARS OF COURTING R32: PERSONAL RETROSPECTIVE ON ITS PROPERTIES AND DESIGN CONSIDERATIONS IN REFRIGERATION, AIR-CONDITIONING, AND HEAT PUMPING**  
 KAZACHKI G.  
 Dayton Phoenix Group, United States

- 14:10 748 WHOLE LIFE EMISSION FOR AIR TO WATER HEAT PUMPS: AN INVESTIGATION**  
 COLOMBO I., MAIDMENT G. G., COWAN D.  
 School of the Built Environment and Architecture, London South Bank University, United Kingdom

- 14:30 312 CRITICAL TEMPERATURE AND PERFORMANCE OF REFRIGERANTS -APPLICATION TO CHILLERS**  
 DE LARMINAT P.  
 Johnson Controls Industries, France

- 14:50 283 A COMPARATIVE STUDY ON THE OPTIMUM PERFORMANCE OF R410A AND R32 REFRIGERATION CYCLES**  
 SHIH Y.-C. (\*), SHIAH Y.-S. (\*), HOUNG Y.-H. (\*), SHIAH S.-W. (\*\*), YU W.-L. (\*\*\*), SHIH S.-H. (\*)  
 (\*) Department of Energy and Refrigerating Air-Conditioning Engineering, National Taipei University of Technology, Taiwan, (\*\*) Taiwan Boiler Association, Taiwan, (\*\*\*) Department of Vehicle Engineering, Army Academy, Taiwan

**AIR-SIDE / SINGLE-PHASE HEAT TRANSFER****B1-Tu-3c Room 304**Chairs: MIYARA A. (*Saga University, Japan*)KONDOU C. (*Nagasaki University, Japan*)

- 13:30 245 HEAT TRANSFER AND PRESSURE DROP CHARACTERISTICS OF WET AIR FLOW IN METAL FOAM UNDER DEHUMIDIFYING CONDITIONS**  
 HU H., DING Y., WENG X., ZHUANG D., WU K., XU X.  
 Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University, China

- 13:50 463 EFFECT OF HEAT CONDUCTION THROUGH THE FINS ON THE AIR SIDE PERFORMANCE OF MINICHANNEL EVAPORATORS UNDER DEHUMIDIFYING CONDITIONS**  
HASSAN A. H., MARTÍNEZ-BALLESTER S., GONZÁLVIZ-MACIÁ J.  
*Institute for Energy Engineering, Universitat Politècnica de València, Spain*
- 14:10 554 HEAT AND MASS TRANSFER TO AIR IN A CROSS FLOW HEAT EXCHANGER WITH SURFACE DELUGE COOLING**  
DIANI A.(\*), DALL'OLIO R.(\*\*), DE ZEN D.(\*\*), MASETTO F.(\*\*), ROSSETTO L.(\*)  
(\* *Università di Padova, Dipartimento di Ingegneria Industriale, Italy*, (\*\*) *Emerson Network Power srl, Italy*)
- 14:30 631 INVESTIGATION OF THE STEADY-STATE TEMPERATURE FIELD CHARACTERISTICS INSIDE A THERMAL CYCLING TEST CHAMBER OF TURBULENT MIXED CONVECTION**  
YANG G., WU J.  
*Shanghai Jiao Tong University, China*
- 14:50 87 COIL SIDE HEAT TRANSFER CHARACTERISTICS STUDY FOR A HELICAL-COIL HEAT EXCHANGER**  
LIN J.-Y.(\*), LIN J.-W.(\*\*), SHIH Y.-C.(\*\*)  
(\* *Department of Energy and Refrigerating, Air-conditioning Engineering, Tungnan University, Taiwan*, (\*\*) *JSRAE, Japan, Department of Energy and Refrigerating Air-Conditioning Engineering, National Taipei University of Technology, Taiwan*)

#### ABSORPTION

##### E1-Tu-3 Room 411+412

Chairs: TBD

WATANABE T. (*Waseda University, Japan*)

- 13:30 KEYNOTE NEW DEVELOPMENTS IN MICROCHANNEL HEAT EXCHANGERS**  
HRNJAK P.  
*University of Illinois (ACRC) and CTS, USA*
- 14:10 109 OPTIMAL DESIGN OF A HYBRID AIR CONDITIONING SYSTEM UNDER ELECTRICAL GRID CONSTRAINT**  
SALAME S.(\*), SAAB J.(\*\*), ZOUGHAI B. A.(\*), MAATOUK C.(\*\*)  
(\* *MINES ParisTech, PSL Research University, CES - Center for Energy efficiency of Systems, France*, (\*\*) *Saint Joseph University, Lebanon*)
- 14:30 516 OPTIMIZATION OF ADSORPTION ISOTHERM TAXONOMY FOR OPEN-CYCLE DESICCANT AIR-CONDITIONING APPLICATIONS**  
SULTAN M.(\*), MIYAZAKI T.(\*\*), SAHA B. B.(\*), KOYAMA S.(\*\*)  
(\* *Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Japan*, (\*\*) *Faculty of Engineering Sciences, Kyushu University, Japan*)
- 14:50 836 THE EFFECT OF HOT WATER FLOW RATE IN THE SOLAR COLLECTOR FLOW LOOP AT SOLAR THERMAL COOLING SYSTEM**  
NASRUDDIN (\*), ARNAS (\*\*), ALHAMID M. I.(\*), SAITO K.(\*\*\*), YABASE H.(\*\*\*\*)  
(\* *Department of Mechanical Engineering, Faculty of Engineering, University of Indonesia, Indonesia*, (\*\*) *Graduate School of Fundamental Science and Engineering, Waseda University, Japan*, (\*\*\*) *Faculty of Science and Engineering, Waseda University, Japan*, (\*\*\*\*) *Energy Solution Engineering Department, Kawasaki Thermal Engineering Co., Ltd., Japan*)

#### COMPRESSOR(1)

##### B2-Tu-3a Room 413

Chairs: KIMATA Y. (*Mitsubishi Heavy Industries, Ltd., Japan*)

SCHIFFMANN J. (*Ecole Polytechnique Fédérale de Lausanne, EPFL, Switzerland*)

- 13:30 26 DEVELOPMENT OF HYDROCARBON SCROLL COMPRESSOR FOR HIGH TEMPERATURE HEAT PUMP**  
OKU T., SATOH H., SHIGA M., NISHIO T., SONOBE T., MATSUI A.  
*Mayekawa MFG. Co., Ltd., Japan*
- 13:50 334 PREDICTION OF GAS LEAKAGE THROUGH CLEARANCES IN SCROLL COMPRESSORS**  
PEREIRA E. L. L., DESCHAMPS C. J.  
*POLO Research Labs for Emerging Technologies in Cooling and Thermophysics, Federal University of Santa Catarina, Brazil*
- 14:10 670 NUMERICAL STUDY ON THE LEAKAGE CHARACTERISTICS OF A SCROLL COMPRESSOR**  
KIM D.(\*), CHUNG H.(\*), JUNG J.(\*), KIM Y.(\*\*)  
(\* *Graduate School of Mechanical Engineering, Korea University, South Korea*, (\*\*) *School of Mechanical Engineering, Korea University, South Korea*)
- 14:30 423 DESIGN AND CONTROL OPTIMIZATION OF R32 TWO-PHASE INJECTION SYSTEM USING SCROLL COMPRESSOR ORIENTED TO DISCHARGE TEMPERATURE AND SYSTEM PERFORMANCE**  
YANG M., SHI W., LI X., WANG B.  
*Department of Building Science, School of Architecture, Tsinghua University, China*
- 14:50 344 COMPARATIVE ANALYSIS OF A VAPOUR-INJECTION SCROLL COMPRESSOR AND A TWO-STAGE RECIPROCATING COMPRESSOR BASED ON ITS APPLICATION RANGE**  
TELLO-OQUENDO F., NAVARRO-PERIS E., GONZÁLVIZ-MACIÁ J., CORBERÁN J. M.  
*Institute for Energy Engineering, Universitat Politècnica de València, Spain*

#### ABSORPTION & ADSORPTION(1)

##### B2-Tu-3b Room 414+415

Chairs: MIYARA A. (*Saga University, Japan*)

ZIEGLER F. (*Technische Universität Berlin, Germany*)

- 13:30 KEYNOTE CO<sub>2</sub> ABSORPTION/DESORPTION PERFORMANCE ENHANCEMENT BY NANOABSORBENTS**  
KANG Y. T.  
*Korea University, South Korea*
- 14:10 159 EXPERIMENTAL STUDY ON SYSTEM PERFORMANCE OF A NOVEL AIR-COOLED TYPE NH<sub>3</sub>-LiNO<sub>3</sub> ABSORPTION REFRIGERATION CYCLE**  
CAI D., HE G., TIAN Q.  
*School of Energy and Power Engineering, Huazhong University of Science and Technology, China*

**14:30 438 THEORETICAL AND EXPERIMENTAL STUDY OF IMPROVED CYCLE FOR LARGE TEMPERATURE LIFTS APPLICATION IN AMMONIA WATER ABSORPTION SYSTEM**  
CHEN X., WANG R. Z., DU S.  
*Institute of Refrigeration and Cryogenics, Key Laboratory for Power Machinery and Engineering of M.O.E., Shanghai Jiao Tong University, China*

**14:50 508 A REVIEW OF THE EXPERIMENTAL PERFORMANCES AND CHALLENGES OF THE ABSORPTION SYSTEM TECHNOLOGIES**  
WANG Y., RULLIERE R., REVELLIN R., HABERSCHILL P.  
*Université de Lyon, CNRS, INSA-Lyon, CETHIL, UMR 5008, France, Université Lyon 1, France*

**SOLAR ENERGY / SORPTION SYSTEMS (ABSORPTION, ADSORPTION, DEC)  
(1)**

**E2-Tu-3 Room 416+417**

Chairs: YAMAGUCHI S. (*Waseda University, Japan*)

TBD

**13:30 214 ANALYSIS ON THE SUITABLE WORKING TEMPERATURE RANGE OF NANOFLUID-BASED DIRECT ABSORPTION SOLAR COLLECTION**  
ZHAO S., XU G., CHEN W., ZHANG X.  
*School of Energy and Environment, Southeast University, China*

**13:50 359 EXPERIMENTAL STUDY OF A SOLAR STORAGE PACKED BED USING PCM CAPSULES HAVING DIFFERENT MELTING POINTS**  
YANG L.(\*), ZHANG X.(\*\*), WANG T.(\*)  
*(\*) Hefei University of Technology, China, (\*\*) Southeast University, China*

**14:10 382 DEVELOPMENT OF A SOLAR ASSISTED HIGH EFFICIENCY SINGLE/DOUBLE EFFECT ABSORPTION AIR CONDITIONING SYSTEM**  
NISHIMURA N.(\*), MATSUBARA T.(\*\*), NAKAGAWA H.(\*), YAMAGA Y.(\*)  
*(\*) Department of Mechanical and Physical Engineering, Graduate School of Engineering, Japan, (\*\*) Energy Engineering Department, Osaka Gas Co., Japan*

**14:30 363 EXPERIMENT AND PREDICTIONS OF ABSORBED SOLAR IRRADIATION DISTRIBUTION ON THE NARROW CHANNEL WALL OF DESICCANT ROTOR**  
LI J., HAMAMOTO Y., MORI H.  
*Kyushu University, Japan*

**14:50 920 BEHAVIOUR OF A RECTANGULAR ADSORBER OF SOLAR ADSORPTION COOLING MACHINE**  
CHEKIROU W.(\*), CHIKOUCHE A.(\*\*), BOUKHEIT N.(\*), KARAALI A.(\*)  
*(\*) Laboratoire de thermodynamique et traitement de surface de matériaux, Université Constantine 1, Algeria, (\*\*) UDES, Unit of Development of the Solar Equipment, Algeria*

**FOOD SCIENCE AND ENGINEERING**

**C2-Tu-3 Room 418**

Chairs: CARSON J. K. (*University of Waikato, New Zealand*)

WATANABE M. (*Tokyo University of Marine Science and Technology, Japan*)

**13:30 KEYNOTE FOOD TECHNOLOGY AND FOOD PRESERVATION : AN OLD NECESSITY WITH A PROMISING FUTURE**  
GUILPART J.  
*IIR President of Section C, France*

**14:10 113 A DSC METHOD FOR DETERMINATION THE QUALITY OF FISH OILS DURING STORAGE OR AFTER PROCESSING**  
TOLSTOREBROV I.(\*), EIKEVIK T. M.(\*), BANTLE M.(\*\*), NORDTVEDT T. S.(\*\*\*), STAVSET O.(\*\*)  
*(\*) Norwegian University of Science and Technology (NTNU), Institute for eEnergi- og Prosessteknikk, Norway, (\*\*) SINTEF Energy Research Ltd., Norway, (\*\*\*) SINTEF Fisheries and Aquaculture Ltd., Norway*

**14:30 685 X-RAY MICRO-TOMOGRAPHY TO QUANTIFY FROZEN ICE CREAM STRUCTURE**  
ALVAREZ G.(\*), CANTRE D.(\*\*), VERBOVEN P.(\*\*), NDOYE F. T.(\*), WARREN M.(\*\*\*), HARTEL W. R.(\*\*\*), NICOLAI B.(\*\*)  
*(\*) Irstea, Refrigeration Process Engineering Research Unit, France, (\*\*) BIOSYST-MeBioS, KU Leuven, Belgium, (\*\*\*) University of Wisconsin, United States*

**14:50 573 A DISCRIMINATING MICROSCOPY TECHNIQUE FOR THE MEASUREMENT OF ICE CRYSTALS AND AIR BUBBLES SIZE DISTRIBUTION IN SORBETS**  
HERNANDEZ O.(\*, \*\*, \*\*\*), NDOYE F.(\*), BENKHELIFA H.(\*\*, \*\*\*), FLICK D.(\*\*, \*\*\*), ALVAREZ G.(\*)  
*(\*) IRSTEA, France, (\*\*) AgroParisTech, UMR1145 Ingénierie Procédés Aliments, France, (\*\*\*) INRA, UMR1145 Ingénierie Procédés Aliments, France*

**TUESDAY, AUGUST 18**

**15:30-17:10**

**LUBRICANTS**

**B1-Tu-4a Room 301**

Chairs: CHEN G. (*Ningbo Institute of Technology, Zhejiang University, China*)

GAO L. (*Fukuoka University, Japan*)

**15:30 338 MAKING THE RIGHT REFRIGERANT LUBRICANT CHOICES**  
KARNAZ J., KULTGEN D.  
*CPI Fluid Engineering, United States*

**15:50 138 EXPERIMENTAL INVESTIGATION OF HEAT TRANSFER AND PRESSURE DROP DURING CONDENSATION OF R134A-LUBRICANT-MIXTURES IN A MULTI-PORT FLAT TUBE**  
KNIPPER P., BERTSCHE D., WETZEL T.  
*Karlsruhe Institute of Technology, Germany*

**16:10 935 DEVELOPMENT OF REFRIGERATION OIL FOR USE WITH R32**  
TOMITA H., TAKAHASHI H., OKIDO T.  
*JX Nippon Oil & Energy Corporation, Japan*

**16:30 23 MISCIBILITY CHARACTERISTICS OF SEVERAL LOW GWP REFRIGERANTS AND TYPICAL LUBRICATING OILS**  
YANG Z., WU X., TIAN T.  
*Key Laboratory of Efficient Utilization of Low and Medium Grade Energy, MOE, School of Mechanical Engineering, Tianjin University, China*

- 16:50 696 EVALUATIONS OF PVE LUBRICANTS FOR A/C SYSTEM WITH THE LOW GLOBAL WARMING POTENTIAL REFRIGERANTS**  
MATSUMOTO T. (\*), KANEKO M. (\*), KAWAGUCHI Y. (\*\*)  
 (\*) Idemitsu Kosan Co.,Ltd., Lubricants Research Laboratory, Japan, (\*\*)  
 Idemitsu Kosan Co.,Ltd., Lubricants Department, Japan

**CYCLE / SYSTEM ANALYSIS (2)**

**B1-Tu-4b Room 303**

Chairs: SHIH Y. (National Taipei University of Technology, Taiwan)  
 DE LARMINAT P. (Johnson Controls Industries, France)

- 15:30 563 EVALUATION OF CYCLE PERFORMANCE OF R448A AND R449A AS R404A REPLACEMENTS IN SUPERMARKET REFRIGERATION SYSTEMS**  
MAKHNATCH P., KHODABANDEH R.  
 Royal Institute of Technology, Department of Energy Technology, Division of Applied Thermodynamics and Refrigeration, Sweden
- 15:50 82 VAPOR COMPRESSION CYCLE MODEL CAPABLE OF SIMULATING WELL-DESCRIBED AND NOT-SO-WELL-DESCRIBED REFRIGERANTS**  
BRIGNOLI R., BROWN J. S.  
 Department of Mechanical Engineering, The Catholic University of America, United States
- 16:10 601 THEORETICAL ANALYSIS OF A NEW HYBRID SYSTEM WITH TWO EJECTORS**  
LANDOULSI H., ELAKHDAR M., NEHDI E., KAIROUANI L.  
 UR Energetic and Environment – ENIT, Tunisia
- 16:30 220 THERMODYNAMIC MODELING AND OPTIMIZATION OF REFRIGERANT MIXTURE FOR SINGLE STAGE VERY LOW TEMPERATURE SYSTEM USING PC-SAFT EQUATION OF STATE**  
JEROME S., VENKATARATHNAM G.  
 Refrigeration and Air-conditioning Lab, Department of Mechanical Engineering, Indian Institute of Technology Madras, India
- 16:50 143 SURVEY ON NONFLAMMABLE LOW GWP REFRIGERANT MIXTURES BASED ON CARBON DIOXIDE FOR APPLICATIONS BELOW 220 K**  
GÖPFERT T., HESSE U.  
 Technische Universität Dresden, Bitzer Chair of Refrigeration, Cryogenics and Compressor Technology, Germany

**DESICCANT**

**E1-Tu-4 Room 411+412**

Chairs: YU P. (School of Energy and Environment, Southeast University, China)  
 TBD

- 15:30 100 PERFORMANCE EVALUATION OF WATER SOURCE MAKEUP AIR UNIT APPLIED DESICCANT ROTOR DEHUMIDIFIED AT LOW-TEMPERATURE ON AIR CONDITIONING SYSTEMS USING WATER SOURCE HEAT PUMP UNITS**  
TANINO M. (\*), MASUDA M. (\*), SAITOU T. (\*\*), KIKUCHIHARA M. (\*\*), HATAKEYAMA M. (\*\*)  
 (\*) Takasago Thermal Engineering Co.,Ltd, R&D Center, Japan, (\*\*)  
 Nippon PMAC Co.,Ltd., R&D Department, Japan

- 15:50 128 STUDY ON ENERGY- EFFICIENCY OF DESICCANT OUTDOOR AIR-CONDITIONING UNIT FOR A DEDICATED AIR- CONDITIONING SYSTEM**  
KAWAMOTO K. (\*), CHO W. (\*\*), KOHNO H. (\*\*\*) , IWAMOTO S. (\*\*), KOGANEI M. (\*\*\*\*), OOKA R. (\*\*\*\*\*), KATO S. (\*\*\*\*\*)  
 (\*) Kawamoto Engineering, Japan, (\*\*) Department of Architecture, Faculty of Engineering, Kanagawa University, Japan, (\*\*\*) Asahi Kogyosha Co. Ltd., Japan, (\*\*\*\*) Division of Perceptual Sciences and Design Engineering, Yamaguchi University, Japan, (\*\*\*\*\*) Institute of Industrial Science, The University of Tokyo, Japan

- 16:10 518 DESICCANT DEWPOINT COOLING SYSTEM INDEPENDENT OF EXTERNAL WATER SOURCES**  
BELLEMO L. (\*), ELMEGAARD B. (\*), MARKUSSEN W. B. (\*), KÆRN M. R. (\*), REINHOLDT L. O. (\*\*)  
 (\*) Technical University of Denmark, Denmark, (\*\*) Danish Technological Institute, Denmark
- 16:30 229 EXPERIMENTAL INVESTIGATIONS ON HYBRID SOLID DESICCANT – VAPOR COMPRESSION AIR-CONDITIONING SYSTEM FOR INDIAN CLIMATE**  
JANI D. B., MISHRA M., SAHOO P. K.  
 Department of Mechanical & Industrial Engineering, Indian Institute of Technology, India
- 16:50 813 STUDY OF THE DYNAMIC CHARACTERISTICS OF LIQUID DESICCANT DEHUMIDIFICATION PROCESSES**  
WANG L. (\*), XIAO F. (\*), NIU X. (\*\*)  
 (\*) Department of Building Services Engineering, The Hong Kong Polytechnic University, Hong Kong, (\*\*) College of Urban Construction and Safety Engineering, Nanjing University of Technology, China

**COMPRESSOR(2)**

**B2-Tu-4a Room 413**

Chairs: OKU T. (Mayekawa Mfg, Co., Ltd., Japan)  
 LI X. (Tsinghua University, China)

- 15:30 917 EVALUATION OF THE SYSTEM AND COMPRESSOR RELIABILITY**  
TANAKA M., MATSUURA H., TAIRA S., NAKAI A.  
 Daikin Industries, Ltd., Japan
- 15:50 345 EVALUATION OF THE INFLUENCE OF THE SUBCOOLING ON THE PERFORMANCE OF VAPOR INJECTION SCROLL COMPRESSORS**  
PITARCH M., NAVARRO-PERIS E., GONZALVEZ-MACIA J., CORBERAN J. M.  
 Instituto de Ingeniería Energética, Universitat Politècnica de València., Spain
- 16:10 411 CAVITATION EFFECTS AND HEAT TRANSFER OF SATURATED WATER-LUBRICATED JOURNAL BEARINGS FOR A TURBO MACHINE**  
SHOYAMA T.  
 Panasonic Corporation, Japan
- 16:30 789 R718 TURBO CHILLERS AND VACUUM ICE GENERATION – TWO APPLICATIONS OF A NEW GENERATION OF HIGH SPEED, HIGH CAPACITY R718 CENTRIFUGAL COMPRESSORS**  
HONKE M., SAFARIK M., HERZOG R.  
 Institute of Air Handling and Refrigeration (ILK Dresden), Germany

- 16:50 12 A HEAT PUMP FOR SPACE APPLICATIONS WITH A LIGHTWEIGHT 200,000 RPM CENTRIFUGAL THREE-STAGE COMPRESSOR SYSTEM**  
 VAN GERNER H. J.(\*), VAN DONK G.(\*), PAUW A.(\*),  
 KRÄHENBÜHL D.(\*\*), ZWYSSIG C.(\*\*), LAPENSÉE S.(\*\*\*)  
 (\*) National Aerospace Laboratory (NLR), Netherlands, (\*\*) Celeroton AG,  
 Switzerland, (\*\*\*) European Space Agency, ESA/ESTEC, Netherlands

**ALTERNATIVE REFRIGERANT**

**B2-Tu-4b Room 414+415**

Chairs: KAGAWA N. (National Defense Academy, Japan)

TBD

- 15:30 231 A THEORETICAL AND EXPERIMENTAL STUDY ON THE VARIABLE EVAPORATING TEMPERATURE REFRIGERATION PERFORMANCE OF NON-AZEOTROPIC REFRIGERANT MIXTURES**  
 YU P.(\*,\*\*), ZHANG X.(\*), LIU J.(\*)  
 (\*) School of Energy and Environment, Southeast University, China, (\*\*) College of Energy and Power Engineering, Nanjing Institute of Technology, China
- 15:50 182 ENVIRONMENTAL IMPACT OF POSSIBLE REPLACEMENTS FOR R22**  
 DRUGHEAN L., ILIE A., GIRIP A., TEODORESCU D.  
 Technical University for Civil Engineering, Romania
- 16:10 603 NON-FLAMMABLE, LOWER GWP ALTERNATIVES TO R-404A**  
 KIM S.(\*), ABBAS L.(\*), RACHED W.(\*\*), BOUSSAND B.(\*\*)  
 (\*) Arkema Inc., United States, (\*\*) Arkema France, France
- 16:30 204 EVALUATION OF R-449A IN FIELD RETROFITS OF R-404A SUPERMARKET SYSTEMS**  
 MINOR B.(\*), GERSTEL J.(\*\*), ROBERTS N.(\*\*\*)  
 (\*) Chemours Company, United States, (\*\*) Chemours Company, Germany, (\*\*\*) Chemours Company, United Kingdom
- 16:50 837 EXPERIMENTAL COMPARISON OF DROP-IN PROCESS OF R22, HYDROCARBONS AND HYDROFLUOROCARBONS IN A REFRIGERATION SYSTEM**  
 ANTUNES A., SOUZA L., MENDOZA O., BANDARRA FILHO E.  
 Faculty of Mechanical Engineering, Federal University of Uberlândia, Brazil

**ENERGY EFFICIENCY(1)**

**E2-Tu-4 Room 416+417**

Chairs: NASRUDDIN N. (University of Indonesia, Indonesia)

TBD

- 15:30 52 CFD STUDY ON THE OPTIMAL NOZZLE EXIT POSITION IN A CO<sub>2</sub> TWO-PHASE EJECTOR**  
 HE Y.(\*), DENG J.(\*\*), ZHANG Z.(\*\*), ZHENG L.(\*\*)  
 (\*) State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University, China, (\*\*) School of Chemical Engineering and Technology, Xi'an Jiaotong University, China
- 15:50 53 A COMPARATIVE STUDY ON REGULATION METHODS FOR TRANSCRITICAL CO<sub>2</sub> EJECTOR EXPANSION REFRIGERATION SYSTEM**  
 ZHENG L.(\*), DENG J.(\*), HE Y.(\*\*)  
 (\*) School of Chemical Engineering and Technology, Xi'an Jiaotong University, China, (\*\*) State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University, China

- 16:10 207 INFLUENCE OF INPUT VARIABLES ON THE IRREVERSIBILITIES OF A CO<sub>2</sub> HEAT PUMP**  
 MAINA P., HUAN Z.  
 Tshwane University of Technology, South Africa
- 16:30 244 INFLUENCE OF AMBIENT CONDITIONS, REFRIGERANT CHARGE AND CONDENSER FAN SPEED ON THERMAL PERFORMANCE OF AN AIR SOURCE HEAT PUMP FOR DRYING FRUITS**  
 KIVEVELE T., HUAN Z.  
 Department of Mechanical Engineering, Mechatronics and Industrial Design, Tshwane University of Technology, South Africa
- 16:50 295 ENHANCED TECHNICAL AND ECONOMIC WORKING DOMAINS OF INDUSTRIAL HEAT PUMPS OPERATED IN SERIES**  
 OMMEN T., JENSEN J. K., MARKUSSEN W. B., ELMEGAARD B.  
 Technical University of Denmark, Department of Mechanical Engineering, Denmark

**FREEZING PROCESS AND SYSTEMS**

**C2-Tu-4 Room 418**

Chairs: EVANS J. (London South Bank University, United Kingdom)

UENO S. (Saitama University, Japan)

- 15:30 863 FREEZING UNDER ELECTRICAL AND MAGNETIC DISTURBANCES; A REVIEW**  
 LE-BAIL A.(\*), XANTHAKIS E.(\*\*), HAVET M.(\*)  
 (\*) LUNAM University, Oniris, UMR 6144 GEPEA, CNRS, France, (\*\*) SP-Food and Bioscience, Sweden
- 15:50 816 FREEZEWAIVE – INNOVATIVE AND LOW ENERGY MICROWAVE ASSISTED FREEZING PROCESS FOR HIGH QUALITY FOODS**  
 XANTHAKIS E.(\*), LE-BAIL A.(\*\*), SHRESTHA M.(\*\*\*), AHRNE L.(\*), BERNARD J.-P.(\*\*\*\*)  
 (\*) SP-Food & Bioscience, Sweden, (\*\*) LUNAM University, CNRS, ONIRIS, UMR 6144 GEPEA, France, (\*\*\*) TTZ, Germany, (\*\*\*\*) SAIREM, France
- 16:10 342 EXPLORING A NEW HETEROGENEITY INDEX TO QUANTIFY THE VARIATION OF COOLING RATES WITHIN SYSTEMS THAT UNDERGO THE FORCED-AIR COOLING PROCESS**  
 JAMAL O. R., YOUNG S. M., LOVE R. J., FERRUA M. J., EAST A. R.  
 Centre for Postharvest and Refrigeration Research, Massey Institute of Food Science and Technology, Massey University, New Zealand
- 16:30 852 OPTIMIZING COMBINED CRYOGENIC AND CONVENTIONAL FREEZING WITH RESPECT TO MASS LOSS AND ENERGY CRITERIA**  
 ROUAUD O., LE-BAIL A.  
 LUNAM, ONIRIS, GEPEA (UMR CNRS 6144), France
- 16:50 134 INFLUENCE OF CLIMATE CONDITIONS ON THE ENERGY CONSUMPTION OF REFRIGERATION SYSTEMS IN THE FOOD PROCESSING INDUSTRY**  
 BANTLE M.(\*), PETROVA I.(\*\*), TOLSTOREBROV I.(\*\*), KVALSVIK K.(\*), NORDTVEDT T.(\*\*\*), EIKEVIK T. M.(\*\*)  
 (\*) SINTEF Energy Research, Norway, (\*\*) Norwegian University of Science and Technology, Norway, (\*\*\*) SINTEF Fishery and Aquaculture, Norway

**WORKSHOP: PROGRESS OF SORPTION SYSTEMS IN JAPAN****WS1-Tu-4 Room 304**Chairs: SAITO K. (*Waseda University, Japan*)YAMAGUCHI S. (*Waseda University, Japan*)**WEDNESDAY, AUGUST 19****8:30-10:10****THERMODYNAMIC PROPERTIES(1)****B1-We-1a Room 301**Chairs: AKASAKA R. (*Kyushu Sangyo University, Japan*)KOBAYASHI T. (*Daikin Industries, Ltd., Japan*)**8:30 HITTING THE BOUNDS OF CHEMISTRY: LIMITS AND TRADEOFFS****KEYNOTE FOR LOW-GWP REFRIGERANTS**MCLINDEN M. O.(\*), BROWN J. S.(\*\*), KAZAKOV A. F.(\*),  
DOMANSKI P. A.(\*\*\*)(\*) *Applied Chemicals and Materials Division, National Institute of Standards and Technology, United States*, (\*\*) *Department of Mechanical Engineering, The Catholic University of America, United States*, (\*\*\*) *Energy and Environment Division, National Institute of Standards and Technology, United States***9:10 83 SATURATED PRESSURE MEASUREMENTS OF *cis*-PENTAFLUOROPROP-1-ENE (R1225ye(Z))**FEDELE L.(\*), DI NICOLA G.(\*\*), BROWN J. S.(\*\*\*), COLLA L.(\*),  
BOBBO S.(\*)(\*) *Construction Technologies Institute, National Research Council, Italy*, (\*\*\*) *Department of Industrial Engineering and Mathematical Sciences, Marche Polytechnic University, Italy*, (\*\*\*) *Department of Mechanical Engineering, The Catholic University of America, United States***9:30 443 THERMODYNAMIC PROPERTIES OF LOW-GWP ALTERNATIVE REFRIGERANTS**FUKUSHIMA M., HAYAMIZU H., HASHIMOTO M.  
ASAHI GLASS CO., LTD., Japan**9:50 752 THERMODYNAMIC PROPERTY MEASUREMENTS FOR HYDROFLUOROBUTENES BY A MAGNETIC LEVITATION DENSIMETER**KAYUKAWA Y.(\*), KIMURA T.(\*\*), KANO Y.(\*), FUJITA Y.(\*), SAITO K.(\*\*)(\*) *Fluid Properties Section, Material Properties Division, National Metrology Institute of Japan, National Institute of Advanced Industrial Science and Technology, AIST, Japan*, (\*\*) *Department of Applied Mechanics and Aerospace Engineering, School of Fundamental Science and Engineering, Waseda University, Japan***CYCLE / SYSTEM ANALYSIS (3)****B1-We-1b Room 303**Chairs: COLOMBO I. (*IIR, France*)DING G. (*Shanghai Jiao Tong University, China*)**8:30 512 NUMERICAL MODELLING AND EXPERIMENTAL INVESTIGATIONS OF LOW-TEMPERATURE DRIVEN EJECTION REFRIGERATION SYSTEM**ŚMIERCIEW K.(\*), PIETROWICZ S.(\*\*), GAGAN J.(\*),  
BUTRYMOWICZ D.(\*)(\*) *Bialystok Technical University, Poland*, (\*\*) *Wroclaw University of Technology, Poland***8:50 506 INVESTIGATIONS OF TWO-PHASE INJECTOR OPERATING WITH ISOBUTANE**ŚMIERCIEW K.(\*), BUTRYMOWICZ D.(\*), PRZYBYLIŃSKI T.(\*\*)(\*) *Bialystok Technical University, Poland*, (\*\*) *The Szewalski Institute of Fluid-Flow Machinery of Polish Academy of Sciences, Poland***9:10 92 DESIGN, DEVELOPMENT AND TESTING OF A COMPRESSIVE THERMOELASTIC COOLING SYSTEM**QIAN S.(\*), WU Y.(\*\*), LING J.(\*), MUEHLBAUER J.(\*), HWANG Y.(\*),  
TAKEUCHI I.(\*\*\*), RADERMACHER R.(\*)(\*) *Department of Mechanical Engineering, University of Maryland, United States*, (\*\*) *Division of Research and Development, Niron Magnetics Inc., United States*, (\*\*\*) *Department of Materials Science and Engineering, University of Maryland, United States***9:30 212 A TRANSIENT REFRIGERATOR MODEL VALIDATION INCLUDING SYSTEM PERTUBATION**RHOADS A.(\*), BORTOLETTO A.(\*\*), MARTIN C.(\*), LING J.(\*)(\*) *Optimized Thermal Systems, Inc., United States*, (\*\*) *Sub-Zero, Inc., United States***INDOOR THERMAL ENVIRONMENT****S1-We-1 Room 313+314**Chairs: WANG F. (*National Chin-Yi University of Technology, Taiwan*)AKIMOTO T. (*Shibaura Institute of Technology, Japan*)**8:30 THERMAL COMFORT AND PRODUCTIVITY FOR THE FUTURE HVAC****KEYNOTE TANABE S.**

Waseda University, Japan

**9:10 219 NUMERICAL ANALYSIS ON THERMAL PERFORMANCE OF TRAILER HOUSE COMPOSITE ENVELOPE USING VACUUM INSULATION PANELS**KAN A.(\*), WANG F.(\*), YU W.(\*\*), CAO D.(\*)(\*) *Merchant Marine College, Shanghai Maritime University, China*, (\*\*) *School of Urban Development and Environmental Engineering, Shanghai Second Polytechnic University, China***9:30 304 HOW HEAT WAVES INFLUENCE INDOOR TEMPERATURE DURING SUMMER IN OLD RENOVATED PARISIAN BUILDINGS**AZOS-DÍAZ K.(\*,\*\*), TREMEAC B.(\*), SIMON F.(\*\*), CORGIER D.(\*\*),  
MARVILLET C.(\*)(\*) *Laboratoire de Chimique Moleculaire, Genie des Procédés Chimique et Energetique, (CMPGCE, EA21), CNAM, France*, (\*\*) *MANASLU Ing., Savoie Technolac, France***9:50 925 ENERGY PERFORMANCE OF THE SILICA AEROGEL GLAZING SYSTEM IN COMMERCIAL BUILDING OF HONG KONG**HUANG Y., NIU J. L.

Department of Building Service Engineering, The Hong Kong Polytechnic University, China

## OTHERS(1)

### E1-We-1 Room 411+412

Chairs: KATSUTA M. (*Waseda University, Japan*)

SHIH Y. (*National Taipei University of Technology, Taiwan*)

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**8:30 KEYNOTE FLOW DISTRIBUTION OF TWO-PHASE REFRIGERANT IN PLATE HEAT EXCHANGERS**

YANG C.-Y., LIN Y.-H., MENG F.-Y., LI G.-C.  
*National Central University, Taiwan*

**9:10 125 AHRI RESEARCH ACTIVITIES ON LOW GLOBAL WARMING POTENTIAL ALTERNATIVE REFRIGERANTS**

WANG X., AMRANE K.  
*Air-Conditioning, Heating, and Refrigeration Institute, United States*

**9:30 910 PARAMETER OPTIMIZATION OF SOLAR-ASSISTED LIQUID DESICCANT COOLING SYSTEM: A CASE STUDY IN HONG KONG**

RONGHUI Q., LIN L., YU H.  
*Renewable Energy Research Group, Department of Building Services Engineering, the Hong Kong Polytechnic University, China*

**9:50 916 EVALUATION OF PERFORMANCE OF HEAT PUMP SYSTEM USING R32 AND HFO-MIXED REFRIGERANT**

HAIKAWA T., NUNO H., TAIRA S.  
*Daikin Industries, Ltd., Japan*

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## COMPRESSOR(3)

### B2-We-1a Room 413

Chairs: FUKUTA M. (*Shizuoka University, Japan*)

TBD

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**8:30 301 FLOW DEVELOPMENT IN THE DISCHARGE OF A COMPRESSOR**

WUJEK S. (\*), HRNJAK P. (\*, \*\*)  
*(\*) Creative Thermal Solutions, Inc., United States, (\*\*) University of Illinois at Urbana-Champaign, Department of Mechanical Science and Engineering, United States*

**8:50 855 COMPRESSIBLE 1D – 3D SIMULATION OF A MUFFLER WITH PSEUDOSOUND PREDICTION LEVELS**

LOPEZ J. (\*), RUANO J. (\*), LEHMKUHL O. (\*, \*\*), RIGOLA J. (\*), OLIVA A. (\*)  
*(\*) Heat and Mass Transfer Technological Center (CTTC), Universitat Politècnica de Catalunya – BarcelonaTech (UPC) ETSEIAT, Spain, (\*\*) Termo Fluids S.L., Spain*

**9:10 124 ANALYSIS OF PRESSURE LOSSES IN THE REFRIGERANT FLOW THROUGH RECIPROCATING COMPRESSOR WITH CO<sub>2</sub>**

RUMAN R. (\*), ŠUSTEK J. (\*), TOMLEIN P. (\*\*)  
*(\*) Faculty of Mechanical Engineering, Slovak University of Technology in Bratislava, Slovak (Republic), (\*\*) Association for Cooling and Air Conditioning Technology, Slovak (Republic)*

**9:30 845 DEVELOPMENT OF A WATER VAPOR COMPRESSOR FOR HIGH TEMPERATURE HEAT PUMP APPLICATIONS**

MADSBOELL H. (\*), WEEL M. (\*\*), KOLSTRUP A. (\*\*\*)  
*(\*) Danish Technological Institute, Denmark, (\*\*) Weel & Sandvig, Scion-DTU, Denmark, (\*\*\*) Rotrex A/S, Denmark*

**9:50 452 PERFORMANCE INVESTIGATION OF A LINEAR COMPRESSOR IN REFRIGERATION SYSTEM WITH ITS NATURAL FREQUENCY REAL-TIME MONITORED**

TANG M., ZOU H., XU H., SHAO S., TIAN C.  
*Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, China*

## ABSORPTION & ADSORPTION(2)

### B2-We-1b Room 414+415

Chairs: DANG C. (*The University of Tokyo, Japan*)

YANG L. (*School of Energy and Environment, Southeast University, China*)

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**8:30 706 RESEARCH ON ENHANCING FALLING-FILM PERFORMANCE OF A NEW SOLAR LIBR ABSORPTION REFRIGERATION SYSTEM**

GU Y., WANG T., ZHAO R., QU C.  
*School of Environmental Science and Engineering, Chang'an University, China, Key Laboratory of Subsurface Hydrology and Ecology in Arid Areas (Chang'an University), Ministry of Education, China*

**8:50 737 THERMODYNAMIC ANALYSIS OF A TWO-STAGE ABSORPTION THERMOCHEMICAL POWER CYCLE**

SHI Y., CHEN G.  
*Institute of Refrigeration and Cryogenics, State Key Laboratory of Clean Energy Utilization, Zhejiang University, China*

**9:10 769 MODELING AND NUMERICAL SIMULATION OF A NOVEL TWO-STAGE ABSORPTION-TRANSCRITICAL HYBRID REFRIGERATION SYSTEM**

HE Y. (\*), JIANG Y. (\*), LI R. (\*), CHEN G. (\*\*), WANG Y. (\*)  
*(\*) Institute of Refrigeration and Cryogenics, Zhejiang University, China, (\*\*) Ningbo Institute of Technology, Zhejiang University, China*

**9:30 859 SIMULATION OF AN ABSORPTION REFRIGERATOR WORKING WITH IONIC LIQUIDS AND NATURAL REFRIGERANTS**

MEYER T., KÜHN R., RICART C., ZEGENHAGEN T., ZIEGLER F.  
*Technische Universität Berlin, Germany*

**9:50 931 TEMPERATURE EFFICIENCY ANALYSIS OF ABSORPTION HEAT EXCHANGERS**

XIE X., JIANG Y.  
*Building Energy Research Center, Tsinghua University, China*

## ENERGY EFFICIENCY(2)

### E2-We-1 Room 416+417

Chairs: JEONG J. (*Waseda University, Japan*)

UEDA K. (*Mitsubishi Heavy Industries, Ltd., Japan*)

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**8:30 632 EXPERIMENTAL STUDY ON PERFORMANCE OF ECONOMIZED VAPOR INJECTION HEAT PUMP SYSTEM USING REFRIGERANT R32**

ZHANG X., GUO X., ZHANG S.  
*Tianjin Key Laboratory of Refrigeration Technology, Tianjin University of Commerce, Tianjin, China*



- 8:50 926 HIGH EFFICIENT HEAT PUMP SYSTEM USING STORAGE TANKS TO INCREASE COP BY MEANS OF THE ISEC CONCEPT – PART I: MODEL VALIDATION**  
 ROTHUIZEN E.(\*), ELMEGAARD B.(\*), MARKUSSEN W. B.(\*), MADSEN C.(\*\*), OLESEN M. F.(\*\*), SØLVSTEN M. Ø.(\*)  
 (\*) Technical University of Denmark, Denmark, (\*\*) Danish Technological Institute, Denmark
- 9:10 169 MODELING AND SIMULATION OF A TRANSCRITICAL CO<sub>2</sub> HEAT PUMP SYSTEM WITH AN INTERNAL HEAT EXCHANGER**  
 SIAN R., WANG C.-C.  
 Department of Mechanical Engineering, National Chiao Tung University, Taiwan
- 9:30 178 EXPERIMENTAL CHARACTERISTICS OF R744 EJECTORS FOR EXPANSION WORK RECOVERY IN HEAT PUMPING INSTALLATIONS**  
 BANASIAK K.(\*), HAFNER A.(\*), EIKEVIK T. M.(\*\*)  
 (\*) SINTEF Energy Research, Norway, (\*\*) Norwegian University of Science and Technology, Norway

### **FREEZING AND CHILLING OF MEAT PRODUCTS**

#### **C2-We-1 Room 418**

Chairs: GUILPART J. (*IIF-IIR, France*)  
 MURATA Y. (*National Research Institute of Fisheries Science, Fisheries Research Agency, Japan*)

- 8:30 487 DEVELOPMENT OF SUPERCOOLING AS A STORAGE TECHNIQUE FOR PORK**  
 EVANS J., STONEHOUSE G.  
 Faculty of Engineering, Science and the Built Environment, London South Bank University, United Kingdom
- 8:50 337 A NEW METHOD TO DESCRIBE THE COOLING PROCESS OF PACKAGED HORTICULTURE PRODUCE**  
 SHIM Y.-M., TAN Y. T., OLANTUNJI J., O'SULLIVAN J. L., LOVE R. J., FERRUA M. J., EAST A. R.  
 Centre for Postharvest and Refrigeration Research, Massey Institute of Food Science and Technology, Massey University, New Zealand
- 9:10 273 NUMERICAL AND EXPERIMENTAL ANALYSIS ON POULTRY FREEZING TIME**  
 RIGHETTI G., PERNIGOTTO G., ZILIO C., LONGO G. A.  
 University of Padova, Department of Management and Engineering, Italy
- 9:30 755 INVESTIGATIONS OF THE DYNAMICS OF MEAT FREEZING AT VARIOUS MODES OF CRYOTREATMENT**  
 SHINBAYEVA A.(\*), ALDIYAROV A.(\*), ARKHAROV I.(\*\*), DROBYSHEV A.(\*)  
 (\*) al-Farabi Kazakh National University, Kazakhstan, (\*\*) Bauman Moscow State Technical University, Russia
- 9:50 335 THE INFLUENCE OF TEMPERATURE MODES DURING SALTING AND RESTING STAGES ON THE MASS TRANSFER IN DRY-CURED HAM**  
 PETROVA I.(\*), TOLSTOREBROV I.(\*), EIKEVIK T. M.(\*), BANTLE M.(\*\*)  
 (\*) Department of Energy and Process Engineering, Norwegian University of Science and Technology (NTNU), Norway, (\*\*) Department of Energy Process, SINTEF Energy Research, Norway

### **WORKSHOP: HEATING AND POWER FROM LOW TEMPERATURE HEAT WS2-We-1 Room 304**

Chair: KONTOMARIS K. (*DuPont Fluorochemicals, United States*)

## **WEDNESDAY, AUGUST 19**

**10:30-12:10**

### **THERMODYNAMIC PROPERTIES(2)**

#### **B1-We-2a Room 301**

Chairs: BROWN J. (*The Catholic University of America, United States*)  
 KAYUKAWA Y. (*National Institute of Advanced Industrial Science and Technology, AIST, Japan*)

- 10:30 679 THERMOPHYSICAL PROPERTY MEASUREMENTS FOR R 1234yf + R 1234ze(E) MIXTURE**  
 HIGASHI Y.  
 Iwaki Meisei University, Japan
- 10:50 111 SURFACE TENSION OF LOW GWP REFRIGERANTS R1234ZE(Z) AND R1233zd(E)**  
 KONDOU C.(\*), NAGATA R.(\*\*), NII N.(\*\*), KOYAMA S.(\*\*,\*\*\*), HIGASHI Y.(\*\*\*\*)  
 (\*) Nagasaki University, Graduate School of Engineering, Japan, (\*\*) Kyushu University, Interdisciplinary Graduate School of Engineering Science, Japan, (\*\*\*) Kyushu University, International Institute for Carbon-Neutral Energy Research, Japan, (\*\*\*\*) Iwaki Meisei University, Department of Science and Engineering, Japan
- 11:10 792 A NEW EQUATION OF STATE FOR 1,1,1,3,3-PENTAFLUOROPROPANE (R-245fa)**  
 AKASAKA R.(\*), ZHOU Y.(\*\*), LEMMON E. W.(\*\*\*)  
 (\*) Faculty of Engineering, Department of Mechanical Engineering, Kyushu Sangyo University, Japan, (\*\*) Honeywell Integrated Technology Co. Ltd., China, (\*\*\*) Applied Chemicals and Materials Division, National Institute of Standards and Technology, United States
- 11:30 198 DETERMINATION OF THERMODYNAMIC PROPERTIES OF REFRIGERANTS BY USING MOLECULAR SIMULATION AND EXPERIMENT: APPLICATION TO DEVELOPMENT OF PREDICTIVE THERMODYNAMIC MODELS**  
 COQUELET C.(\*), HOURIEZ C.(\*), JAUBERT J. N.(\*\*)  
 (\*) MINES ParisTech, PSL Research University, CTP - Centre of Thermodynamic of Processes, France, (\*\*) Université de Lorraine, Ecole Nationale Supérieure des Industries Chimiques, Laboratoire Réactions et Génie des Procédés (UMR CNRS 7274), France
- 11:50 353 LOWER GWP REFRIGERANTS FOR REFRIGERATION APPLICATIONS**  
 ARIMOTO H., TSUCHIYA T., YAMADA Y., ITANO M., SHIBANUMA T.  
 Chemical R&D Center, Daikin Industries, Ltd., Japan

### **ADSORPTION(1)**

#### **B1-We-2b Room 303**

Chairs: DAIGUJI H. (*The University of Tokyo, Japan*)  
 TU Y. (*Shanghai Jiao Tong University, China*)

- 10:30 67 VISUALIZATION AND MEASUREMENT OF ADSORPTION AND DESORPTION PROCESS IN ACTIVATED CARBON/ETHANOL PAIR ADSORBER**  
MURATA K. (\*), ASANO H. (\*), SAITO Y. (\*\*)  
 (\*) Department of Mechanical Engineering, Kobe University, Japan, (\*\*) Kyoto University Research Reactor Institute, Japan
- 10:50 105 TRANSIENT SIMULATION OF FINNED TUBE TYPE ADSORBER EMPLOYING ACTIVATED CARBON-ETHANOL AS ADSORBENT-REFRIGERANT PAIR**  
JRIBI S. (\*, \*\*), MIYAZAKI T. (\*), SAHA B. B. (\*\*\*) , KOYAMA S. (\*)  
 (\*) Faculty of Engineering Sciences, Kyushu University, Japan, (\*\*) Laboratory of Electro-Mechanical Systems, National Engineering School of Sfax, University of Sfax, Tunisia, (\*\*\*) Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Japan
- 11:10 261 ADSORPTION-BASED LOW TEMPERATURE REFRIGERATION USING WATER - ETHYLENE GLYCOL MIXTURES**  
SEILER J., HACKMANN J., LANZERATH F., BARDOW A.  
 Technical Thermodynamics, RWTH Aachen University, Germany
- 11:30 425 TEMPERATURE-HEAT DIAGRAM ANALYSIS METHOD FOR MULTI-STAGE HEAT REGENERATION PHYSICAL ADSORPTION REFRIGERATION CYCLE**  
XU S. Z., WANG L. W., WANG R. Z.  
 Institute of Refrigeration and Cryogenics, Key Laboratory for Power Machinery and Engineering of M.O.E, Shanghai Jiao Tong University, China

#### GREEN BUILDING(1)

##### S1-We-2 Room 313+314

Chairs: SU Y. (National Taipei University of Technology, Taiwan)  
 IWAMOTO S. (Kanagawa University, Japan)

- 10:30 KEYNOTE THE FIRST ZERO-CARBON ARCHITECTURE IN TAIWAN THE MAGIC SCHOOL OF GREEN TECHNOLOGY, NCKU**  
LIN H.-T.  
 Department of Architecture, National Cheng-Kung University, Taiwan
- 11:10 489 INNOVATIVE DESIGN AND COMMISSIONING OF A POSITIVE ENERGY BALANCE PLOT IN LYON (FRANCE): THE HIKARI PROJECT**  
 SIMON F. (\*), PIRIOU C. (\*), CORGIER D. (\*), NISHIMURA N. (\*\*), ASAKURA H. (\*\*), USHIBA G. (\*\*\*), NAKAMURA M. (\*\*\*)  
 (\*) MANASLU Ing., Savoie Technolac, France, (\*\*) TOSHIBA Corporation, Japan, (\*\*\*) TAKENAKA CORPORATION, Japan
- 11:30 825 DESIGNING A NEAR ZERO ENERGY SUPERMARKET – MINIMISING ENERGY USE AND ENSURING THE SUPPLY OF RENEWABLE ENERGY**  
LINDBERG U., ROLFSMAN L., JENSEN S., RUUD S.  
 SP Technical Research Institute of Sweden, Sweden
- 11:50 881 A METHODOLOGY FOR ENERGY USE EVALUATION IN COMPLEX BUILDINGS – APPLIED IN A SHOPPING MALL CASE STUDY**  
STENSSON S. (\*), DAHLENBÄCK J.-O. (\*\*)  
 (\*) SP Technical Research Institute of Sweden, Sweden, (\*\*) Chalmers University of Technology, Sweden

#### LIQUID SOLID DESICCANT

##### E1-We-2 Room 411+412

Chairs: XIAO F. L. (The Hong Kong Polytechnic University, China)  
 MASHIMO K. (Waseda University, Japan)

- 10:30 223 PERFORMANCE ANALYSIS AND OPTIMIZATION OF HEAT PUMP DRIVEN LIQUID DESICCANT HYBRID AIR-CONDITIONING SYSTEMS**  
 CHEN Y., ZHANG X., YIN Y.  
 School of Energy and Environment, Southeast University, China
- 10:50 640 ANALYSIS OF THE EFFECT ON THE SYSTEM PERFORMANCE BY THE REFLUX RATIO OF REGENERATION SOLUTION IN LIQUID DESICCANT SYSTEM**  
NIU X., LI X., QIU W.  
 College of Urban Construction and Safety Engineering, Nanjing Tech University, China
- 11:10 403 EXPERIMENTAL RESEARCH ON DEHUMIDIFICATION PERFORMANCE OF A THERMOELECTRIC REFRIGERATOR**  
 LUO Z., ZHANG X., WANG S.  
 College of Mechanical Engineering, Tongji University, China
- 11:30 228 NUMERICAL SIMULATION OF ROTARY DESICCANT DEHUMIDIFIER FOR HYBRID SOLID DESICCANT – VAPOR COMPRESSION AIR-CONDITIONING SYSTEM**  
 JANI D. B., MISHRA M., SAHOO P. K.  
 Department of Mechanical & Industrial Engineering, Indian Institute of Technology, India
- 11:50 396 EXPERIMENTAL INVESTIGATION ON SOLID DESICCANT COOLING SYSTEM BASED ON DESICCANT COATED HEAT EXCHANGER AND REGENERATIVE COOLER**  
 GE T. S. (\*), WANG H. H. (\*\*)  
 (\*) Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University, Key Laboratory of Power Mechanical Engineering, MOE China, China, (\*\*) Merchant Marine College, Shanghai Maritime University, China

#### COMPRESSOR(4) / CYCLE

##### B2-We-2a Room 413

Chairs: TOJO K. (TOJO R&D Design Office / Waseda University, Japan)  
 HRNJAK P. (University of Illinois - CTS, United States)

- 10:30 329 CO-ROTATING SCROLL MACHINERY APPLIED TO VAPOR POWER AND VAPOR COMPRESSION CYCLES**  
MENDOZA L., SCHIFMANN J.  
 Laboratory of Applied Mechanical engineering, Ecole Polytechnique Fédérale de Lausanne, EPFL, Switzerland
- 10:50 828 EXPERIMENTAL EVALUATION OF A CASCADE REFRIGERATION SYSTEM OPERATING WITH R744/R134a**  
 SOUZA L., ANTUNES A., MENDOZA O., BANDARRA FILHO E.  
 University Federal of Uberlândia, Brazil
- 11:10 746 DEVELOPMENT OF HIGH EFFICIENCY CYCLES FOR DOMESTIC REFRIGERATOR-FREEZER APPLICATION**  
YANG M., JUNG C. W., KANG Y. T.  
 School of Mechanical Engineering, Korea University, South Korea

**11:30 37 REFRIGERATION CYCLE EFFICIENCY IMPROVEMENT SUPPORTED ON DUAL RESPONSE OPTIMIZATION**  
COSTA N. R. (\*,\*\*), GARCIA J. (\*)  
(\* ) Instituto Politécnico Setúbal, Escola Superior de Tecnologia de Setúbal, Campus do IPS, Portugal, (\*\* ) UNIDEMI/DEMI, Faculdade de Ciências e Tecnologia-Universidade Nova de Lisboa, Portugal

**11:50 760 EXPERIMENTAL STUDY ON THE DYNAMIC CHARACTERISTICS OF TWIN SCREW REFRIGERATION COMPRESSOR**  
HOU F., ZHAO Z., HE Z., XING Z.  
Xi'an Jiaotong University, China

### **ABSORPTION & ADSORPTION(3)**

#### **B2-We-2b Room 414+415**

Chairs: HAMAMOTO Y. (Kyushu University, Japan)

WANG L. (Mechanical Engineering School, Shanghai Jiao Tong University, China)

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**10:30 241 ADSORPTION-BASED AIR-CONDITIONING FOR BATTERY-DRIVEN ELECTRIC BUSES**  
BAU U., SCHREIBER H., LANZERATH F., BARDOW A.  
Chair of Technical Thermodynamics, RWTH Aachen University, Germany

**10:50 413 EXPERIMENT STUDY ON A RESORPTION REFRIGERATION AND ELECTRICITY SYTEM**  
JIANG L., WANG L., LIU C., WANG R.  
Institute of Refrigeration and Cryogenics, Key Laboratory for Power Machinery and Engineering of M.O.E, Shanghai Jiao Tong University, China

**11:10 560 LITHIUM BROMIDE/R718 HYBRID SORPTION & COMPRESSION CYCLE**  
ECKERT T., HELM M., GRASSEL A., SCHWEIGLER C.  
University of Applied Sciences Munich, Cooperative Graduate Center "Building Services Engineering & Energy Efficiency", Germany

**11:30 218 EXPERIMENTAL INVESTIGATION ON ENHANCEMENT OF AMMONIA-WATER FALLING FILM GENERATION BY ADDING ZnFe<sub>2</sub>O<sub>4</sub> NANO-PARTICLES**  
LI Y., DU K., HU H., E W., YANG L.  
School of Energy and Environment, Southeast University, China

**11:50 534 EXPERIMENTAL STUDY OF FALLING FILMS OVER TUBE BUNDLE DISTILLER IN AMMONIA-WATER LIQUID MIXTURES**  
NARVÁEZ-ROMO B. (\*), ZAVALETA-AGUILAR E. W. (\*,\*\*), SIMÕES-MOREIRA J. R. (\*,\*\*)  
(\* ) SISEA – Alternative Energy Systems Laboratory, Mechanical Engineering Department, Escola Politécnica, University of São Paulo, Brazil, (\*\* ) Energy Graduate Program, University of São Paulo, Brazil

### **INDUSTRIAL HEAT PUMPS(1)**

#### **E2-We-2 Room 416+417**

Chairs: ARNAS A. (Waseda University, Japan)

TSUCHIYA T. (Fuji Electric, Japan)

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**10:30 24 HIGH-TEMPERATURE HEAT PUMP-ASSISTED SOFTWOOD DRYER: SIZING AND CONTROL REQUIREMENTS & ENERGY PERFORMANCE**  
MINEA V.  
Hydro-Québec Research Institute, Laboratoire des technologies de l'énergie (LTE), Canada

**10:50 135 HEAT PUMP DRYING: USE OF AMBIENT AIR AS ENERGY SOURCE FOR COOLING**  
BANTLE M. (\*), TOLSTOREBROV I. (\*\*), NORDTVEDT T. S. (\*\*\*), STAVSET O. (\*), CLAUSSEN I. C. (\*)  
(\* ) SINTEF Energy Research, Norway, (\*\* ) Norwegian University of Science and Technology, Norway, (\*\*\*) SINTEF Fishery and Aquaculture, Norway

**11:10 237 OPTIMIZING THE COMPRESSION/ABSORPTION HEAT PUMP SYSTEM AT HIGH TEMPERATURES**  
BERGLAND M., EIKEVIK T. M., TOLSTOREBROV I.  
Norwegian University of Science and Technology (NTNU), Norway

**11:30 242 INDUSTRIAL HEAT PUMP USING FLUID MIXTURE**  
ENDO N., HIRANO S.  
National Institute of Advanced Industrial Science and Technology (AIST), Japan

**11:50 414 TRENDS IN INDUSTRIAL HEAT PUMP TECHNOLOGY IN JAPAN**  
WATANABE C. (\*), UCHIYAMA Y. (\*\*), HIRANO S. (\*\*\*), HIKAWA T. (\*\*\*)  
(\* ) Chubu Electric Power Co., Inc., Japan, (\*\* ) University of Tsukuba, Japan, (\*\*\*) National Institute of Advanced Industrial Science and Technology, Japan, (\*\*\*\*) Heat Pump & Thermal Storage Technology Center of Japan, Japan

### **FREEZING AND CHILLING OF FISHERIE PRODUCTS**

#### **C2-We-2 Room 418**

Chairs: LE BAIL A. (LUNAM University, Oniris, UMR 6144 GEPEA, CNRS, France)

ARAKI T. (The University of Tokyo, Japan)

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**10:30 136 CHILLING OF SALMON IN REFRIGERATED SEA WATER**  
BANTLE M. (\*), STAVSET O. (\*), NORDTVEDT T. S. (\*\*\*), GULLSVÅG P. E. (\*), EIKEVIK T. M. (\*\*), TOLSTOREBROV I. (\*\*)  
(\* ) SINTEF Energy Research Ltd., Norway, (\*\* ) Norwegian University of Science and Technology (NTNU), Norway, (\*\*\*) SINTEF Fishery and Aquaculture, Norway

**10:50 310 EFFECT OF FREEZING CONDITIONS ON THE EXTRACTIVE COMPONENT IN OYSTER CRASSOSTREA GIGAS**  
MURATA Y., TOUHATA K.  
National Research Institute of Fisheries Science, Fisheries Research Agency, Japan

**11:10 117 SIMULATION OF A FISH FREEZING TUNNEL USING MODELICA**  
STAVSET O. (\*), WIDELL K. N. (\*), BANTLE M. (\*), NORDTVEDT T. S. (\*\*), TOLSTOREBROV I. (\*\*\*)  
(\* ) SINTEF Energy Research, Norway, (\*\* ) Norwegian University of Science and Technology (NTNU), Department of Energy and Process Engineering, Norway, (\*\*\*) SINTEF Fishery and Aquaculture, Norway

**11:30 115 CHALLENGES OF THE USAGE OF ULTRA-LOW TEMPERATURES FOR FISH FREEZING AND STORAGE**  
EIKEVIK T. M.(\*), TOLSTOREBROV I.(\*), BANTLE M.(\*\*),  
NORDTVEDT T. S.(\*\*\*), STAVSET O.(\*\*)  
(\* Norwegian University of Science and Technology (NTNU), Norway,  
(\*\*) SINTEF Energy Research Ltd., Norway, (\*\*\*) SINTEF Fisheries and  
Aquaculture Ltd., Norway

**11:50 831 COMPARISON OF SEVERAL CORRELATIONS INCLUDE ONE UTILIZING SORLET BAND FOR SPECTROPHOTOMETRIC DETERMINATION OF METMYOGLOBIN IN TUNA MEAT EXTRACTS**  
ZHAO L., SUZUKI T., WATANABE M., SUZUKI T.  
Department of Food Science and Technology, Graduate School of Tokyo  
University of Marine Science and Technology, Japan

**WORKSHOP: HEAT PUMP SYSTEMS R&D BY NEDO**

**WS3-We-2 Room 304**

Chair: SHIMA M. (NEDO, Japan)

**WEDNESDAY, AUGUST 19**

**12:10-13:30**

**POSTER SESSION**

**Room 315**

**A1-We-P**

- 66 THERMAL COOLING MULTICHIP ULTRA HIGH POWER LED USING REFRIGERATION CYCLE SYSTEM**  
HSU C.-L., WANG W.-C.  
Department of Refrigeration, Air Conditioning and Energy Engineering,  
National Chin-Yi University of Technology, Taiwan
- 352 INVESTIGATIONS ON THE DRIVING VOLTAGE WAVEFORMS OF THE LINEAR COMPRESSOR FOR STIRLING-TYPE PULSE TUBE CRYOCOOLER**  
TAN J.(\*,\*\*), DANG H.(\*), ZHAO Y.(\*,\*\*), ZHANG L.(\*,\*\*), GAO Z.(\*,\*\*),  
BAO D.(\*,\*\*),  
(\* National Laboratory for Infrared Physics, Shanghai Institute of  
Technical Physics, Chinese Academy of Sciences, China, (\*\* University of  
Chinese Academy of Sciences, China
- 362 INVESTIGATION ON A J-T COOLER USED TO COUPLE WITH A PULSE TUBE CRYOCOOLER**  
GAO Z.(\*,\*\*), DANG H.(\*), ZHAO Y.(\*,\*\*), BAO D.(\*,\*\*), TAN J.(\*,\*\*),  
ZHANG L.(\*,\*\*),  
(\* Shanghai Institute of Technical Physics of the Chinese Academy of  
Science, China, (\*\* University of Chinese Academy of Science, China
- 370 INVESTIGATION ON PULSE TUBE/J-T HYBRID CRYOCOOLER CAPABLE OF FAST COOL DOWN**  
GAO Z.(\*,\*\*), DANG H.(\*), ZHAO Y.(\*,\*\*), BAO D.(\*,\*\*), TAN J.(\*,\*\*),  
ZHANG L.(\*,\*\*),  
(\* Shanghai Institute of Technical Physics of the Chinese Academy of  
Science, China, (\*\* University of Chinese Academy of Science, China

**420 INVESTIGATION ON A 130 Hz MINIATURE COAXIAL PULSE TUBE CRYOCOOLER**  
ZHAO Y., DANG H., GAO Z., BAO D., ZHANG L., TAN J.  
Shanghai Institute of Technical Physics, Chinese Academy of Sciences,  
China

**A2-We-P**

**894 A PRESSURE SWING ADSORPTION - CRYOGENERATOR HYBRID SYSTEM FOR LIQUEFACTION OF NITROGEN**  
CHOWDHURY D. R., CHAKRABORTY N. R., SARKAR S. C.  
Centre for Rural & Cryogenic Technologies, Jadavpur University, India

**B1-We-P**

- 158 BOILING HEAT TRANSFER PERFORMANCE OF THREE INTERNALLY ENHANCED TUBES USING R22**  
OUYANG X.(\*), CHEN J.(\*), LI T.(\*\*)  
(\* Institute of Refrigeration and Cryogenics, University of Shanghai for  
Science and Technology, China, (\*\* DENSO (CHINA) INVESTMENT CO.,  
LTD. Shanghai Technical Center, China
- 296 CALCULATION AND EXPERIMENTAL VERIFICATION OF HEAT TRANSFER COEFFICIENT FOR LOW PRESSURE METHANOL EVAPORATOR**  
HAŁON T., ZAJĄCZKOWSKI B., KRÓLICKI Z., WOJTASIK K.  
Wrocław University of Technology, Katedra Termodynamiki, Teorii Maszyn  
i Urządzeń Ciepłych, Poland
- 306 INVESTIGATION AND THEORETICALLY ANALYSIS OF DRAG REDUCTION NANOFLUIDS**  
CHEN X., YANG L., DU K.  
School of Energy and Environment, Southeast University, China
- 340 THERMODYNAMIC PROPERTIES OF FLUOROCARBONS: SIMULATIONS AND EXPERIMENT**  
DOUBEK M., VACEK V.  
Faculty of Mechanical Engineering, Department of Physics, Czech Technical  
University in Prague, Czech (Republic)
- 490 INVESTIGATIONS OF TWO-PHASE EJECTOR OPERATING WITH CARBON DIOXIDE IN SUBCRITICAL CYCLE**  
ŚMIERCIEW K.(\*), BUTRYMOWICZ D.(\*), BAJ P.(\*\*), KARWACKI J.(\*\*\*),  
BERGANDER M.(\*\*\*\*)  
(\* Białystok Technical University, Poland, (\*\* Institute of Aviation,  
Poland, (\*\*\*) The Szwedzki Institute of Fluid-Flow Machinery of Polish  
Academy of Sciences, Poland, (\*\*\*\*) Nazarbayev University, Kazakhstan
- 648 EFFECT OF ABSORPTION CONDITIONS ON ENHANCEMENT OF AMMONIA/WATER BUBBLE ABSORPTION IN A BINARY NANOFLUID**  
SU F.(\*), ZHAO N.(\*), DENG Y.(\*), CUI W.(\*), MA H.(\*\*)  
(\* Dalian Maritime University, China, (\*\* University of Missouri –  
Columbia, United States
- 690 HUMIDITY AND CYCLE PERIOD EFFECT ON HYGROSCOPIC EFFICIENCY OF DESICCANT COATING HEAT EXCHANGERS WITH DIFFERENT DESICCANTS**  
LUO W.-J., LU C.-W., CHENG Y.-S., LIN Z.-H.  
National Chin-Yi University of Technology, Department of Refrigeration, Air  
Conditioning and Energy Engineering, Taiwan

- 698 EFFECT OF FIN GEOMETRY ON CONDENSATION HEAT TRANSFER AND CONDENSATE FLOW MODES OF R245fa ON HORIZONTAL ENHANCED SURFACE TUBES**  
 AKADA I.(\*), MATSUNO T.(\*\*), NOGUCHI T.(\*\*\*), JIGE D.(\*\*\*), INOUE N.(\*\*\*)  
 (\*) Graduate School of Marine Science and Technology, Tokyo University of Marine Science and Technology, Japan, (\*\*) Kobelco & Materials Copper Tubes Co. LTD., Japan, (\*\*\*) Tokyo University of Marine Science and Technology, Japan
- 700 PRESSURE DROP AND HEAT TRANSFER CHARACTERISTICS OF SINGLE-PHASE FLOW IN CORRUGATED TUBES FOR HOT-WATER SUPPLY SYSTEMS**  
 KURAYAMA S.(\*), WATANABE K.(\*), JIGE D.(\*\*), INOUE N.(\*\*), TAKAHASHI H.(\*\*\*)  
 (\*) Graduate School of Marine Science and Technology, Tokyo University of Marine Science and Technology, Japan, (\*\*) Tokyo University of Marine Science and Technology, Japan, (\*\*\*) Kobelco & Materials Copper Tube, LTD., Japan
- 702 CONDENSATION HEAT TRANSFER AND PRESSURE DROP OF AZEOTROPIC MIXTURE REFRIGERANT R32/R1270 INSIDE HORIZONTAL SMALL-DIAMETER TUBES**  
 HIROSE M.(\*), ICHINOSE J.(\*\*), JIGE D.(\*\*\*), INOUE N.(\*\*\*)  
 (\*) Graduate School of Marine Science and Technology, Tokyo University of Marine Science and Technology, Japan, (\*\*) National Fisheries University, Japan, (\*\*\*) Tokyo University of Marine Science and Technology, Japan
- 726 PRESSURE DROP AND HEAT TRANSFER FOR FLOW BOILING INSIDE HORIZONTAL SMOOTH AND INTERNALLY HELICAL-GROOVED SMALL-DIAMETER TUBES**  
 SAGAWA K.(\*), JIGE D.(\*\*), INOUE N.(\*\*), HABA T.(\*\*\*)  
 (\*) Graduate School of Marine Science and Technology, Tokyo University of Marine Science and Technology, Japan, (\*\*) Tokyo University of Marine Science and Technology, Japan, (\*\*\*) Kobelco & Materials Copper Tube, LTD., Japan

## B2-We-P

- 56 CHARACTERISTICS OF SCROLL COMPRESSOR REFRIGERATION/ HEAT PUMP SYSTEM WITH MULTI-VAPOR INJECTION**  
 XU S., MA G., WANG X.  
 Beijing University of Technology, Chaoyang District, China
- 422 MULTIVARIATE OPTIMIZATION OF A HEAT EXCHANGER WITH MICROCHANNEL COIL**  
 GLAZAR V., TRP A., LENIC K., FRANKOVIC B.  
 University of Rijeka, Faculty of Engineering, Croatia
- 586 ICE SLURRY AS SECONDARY COOLANT IN AIR COOLERS. MATHEMATICAL MODEL AND VALIDATION**  
 DIZ R., FERNÁNDEZ-SEARA J., PARDIÑAS Á. Á.  
 Área de Máquinas y Motores Térmicos, Universidad de Vigo, Spain
- 858 NATURAL REFRIGERANT MIXTURE ALTERNATIVES RETROFIT ECO EFFICIENCY COMPARATIVE STUDY CASE**  
 TARLEA G.(\*), VINCERIUC M.(\*\*), ZABET I.(\*\*), TARLEA A.(\*\*)  
 (\*) Technical University of Civil Engineering, Romania, (\*\*) Romanian General Association of Refrigeration, Romania

## C2-We-P

- 110 GENERATION OF GAMMA-AMINO BUTYRIC ACID (GABA) IN SOYBEAN BY FREEZING AND SUBSEQUENT STORAGE**  
 UENO S.(\*), IRYO N.(\*), SASAO S.(\*\*), ARAKI T.(\*\*), KIMIZUKA N.(\*\*\*)  
 (\*) Saitama University, Japan, (\*\*) The University of Tokyo, Japan, (\*\*\*) Miyagi University, Japan
- 166 THE USE OF REFRIGERATED STORAGE, PRETREATMENT WITH VAPORS OF ESSENTIAL OILS, AND ACTIVE FLOW-PACKING, IMPROVES THE SHELF LIFE AND SAFETY OF FRESH DILL**  
 LÓPEZ-GÓMEZ A., BOLUDA-AGUILAR M., SOTO-JOVER S.  
 Department of Food Engineering and Agricultural Equipment, Universidad Politécnica de Cartagena, Spain
- 170 THE USE OF CARDBOARD TRAYS WITH SMART ACTIVE INTERNAL LINING FOR ENHANCING THE SHELF LIFE AND SAFETY OF FRESH TOMATOES**  
 LÓPEZ-GÓMEZ A., BOLUDA-AGUILAR M., SOTO-JOVER S.  
 Department of Food Engineering and Agricultural Equipment, Universidad Politécnica de Cartagena, Spain
- 302 EFFECT OF FREEZING STORAGE ON INACTIVATION OF ESCHERICHIA COLI IN LIQUID WHOLE EGG WITH SUCROSE AND HIGH HYDROSTATIC PRESSURE TREATMENT**  
 UENO S.(\*), HAYASHI M.(\*\*), IGUCHI A.(\*\*), SHIGEMATSU T.(\*\*)  
 (\*) Saitama University, Japan, (\*\*) Niigata University of Pharmacy and Applied Life Sciences, Japan
- 440 LIFE CYCLE ASSESSMENT OF SALMON COLD CHAINS: COMPARISON BETWEEN CHILLING AND SUPERCHILLING TECHNOLOGIES**  
 HOANG H. M.(\*), LEDUCQ D.(\*), BROWN T.(\*\*), MAIDMENT G.(\*\*), INDERGARD E.(\*\*\*), ALVAREZ G.(\*)  
 (\*) Irstea, UR GPAN, France, (\*\*) School of the Built Environment and Architecture, London South Bank University, United Kingdom, (\*\*\*) SINTEF Energy Research, Norway
- 472 THE USE OF CARDBOARD BOX WITH SMART ACTIVE INTERNAL LINING AND WRAPPING WITH ACTIVE BIOPOLYMER FILM FOR ENHANCING THE SHELF LIFE AND SAFETY OF FRESH BROCCOLI**  
 LÓPEZ GÓMEZ A., BOLUDA AGUILAR M., SOTO JOVER S., ANTOLINOS LÓPEZ V., MARTÍNEZ HERNÁNDEZ G. B.  
 Department of Food Engineering and Agricultural Equipment, Universidad Politécnica de Cartagena, Spain
- 496 THE USE OF PRETREATMENT WITH ESSENTIAL OILS VAPOR AND ACTIVE ALVEOLUS TRAYS FOR IMPROVING THE SHELF LIFE AND SAFETY OF FRESH PEACHES**  
 LÓPEZ GÓMEZ A., BOLUDA AGUILAR M., SOTO JOVER S., MARTÍNEZ HERNÁNDEZ G. B.  
 Department of Food Engineering and Agricultural Equipment, Universidad Politécnica de Cartagena, Spain

## D1-We-P

- 778 INVESTIGATION ON CRYSTALLIZATION PROPERTIES OF TITANIUM DIOXIDE NANOFLUIDS**  
 JIA L., CHEN Y., LIN G., MO S., YIN T.  
 Guangdong Province Key Laboratory on Functional Soft Matter, Soft Matter Center, Guangdong University of Technology, China

**D2-We-P**

- 538 DIMENSIONNEMENT DES ENGINs MULTI TEMPERATURES : CALCUL, METHODOLOGIE, EXEMPLES, IMPACT SUR LE DIMENSIONNEMENT**  
SUQUET T., CAVALIER G., DEVIN E.  
*Cemafruid, France*

**E1-We-P**

- 62 PERFORMANCE EVALUATION OF A SOLAR EJECTOR-VAPOUR COMPRESSION CYCLE FOR COOLING APPLICATION USING CARBON DIOXIDE AS WORKING FLUID**  
MEGDOULI K.(\*), ELAKHDAR M.(\*\*), NAHDI E.(\*\*), KAIROUANI L.(\*\*), MHIMID A.(\*)  
 (\*) Laboratoire d'Études des Systèmes Thermiques et Énergétiques Ecole National d'ingénieur de Monastir, Tunisia, (\*\*) Unité de Recherche Energétique et Environnement, Ecole National d'ingénieur de Tunis, Tunisia
- 184 BIVALENT AIR-CONDITIONING SYSTEM FOR A SUPERMARKET**  
 HERA D.(\*), ILIE A.(\*), GIRIP A.(\*), ILIE G.(\*\*), CUBLESAN V.(\*)  
 (\*) Technical University for Civil Engineering, Romania, (\*\*) University College London, United Kingdom
- 232 BASIC STUDY ON HUMIDITY REGULATION SYSTEM BY USING MAGNETOCALORIC EFFECT**  
NAGAMINE R.(\*), OKAMURA T.(\*), HIRANO N.(\*\*), TAKAHASHI M.(\*\*\*), TANAKA K.(\*\*\*)  
 (\*) Tokyo Institute of Technology, Japan, (\*\*) Chubu Electric Power Co., Inc., Japan, (\*\*\*) Takenaka Co., Japan
- 418 RETROFIT OF R-410A IN A WATER CHILLER: TEST OF FOUR LOW GWP CANDIDATES**  
 HANNA R., ORTEGO E., ZOUGHAI B. A.  
*MINES ParisTech, PSL Research University, France*
- 494 NUMERICAL METHOD ON PREDICTING DISTRIBUTION OF LEAKED REFRIGERANT IN INDOOR SPACE AND ITS EXPERIMENTAL OBSERVATION**  
HATTORI K., FUKUOKA M., MURATA K., TAIRA S., TOMIOKA K.  
*Daikin Industries, Ltd., Japan*
- 680 EXPERIMENTAL STUDY ON LOW GWP REFRIGERANT R446A AS AN ALTERNATIVE TO R410A IN RESIDENTIAL AIR CONDITIONER**  
LIN E., NIU Y., HUO H., ZOU G., LIN Y., DING Z.  
*Honeywell Integrated Technology, China*
- 738 COMPARISON ANALYSIS OF MASS DIFFUSIVITY EFFECT ON A DAMPER-CONTROLLED DESICCANT DEHUMIDIFIER**  
LEE C.-S.(\*), LEE D.-Y.(\*\*), KANG B. H.(\*\*\*)  
 (\*) Department of Mechanical Engineering, Graduate School, Kookmin University, South Korea, (\*\*) Energy Mechanics Research Center, Korea Institute of Science & Technology, South Korea, (\*\*\*) School of Mechanical Engineering, Kookmin University, South Korea

**E2-We-P**

- 10 SIMULATION OF A DOUBLE EFFECT H<sub>2</sub>O-LIBR ABSORPTION CHILLER DRIVEN BY SOLAR CONCENTRATING PARABOLIC TROUGH COLLECTORS**  
 BORDOGNA P.(\*), FERNÁNDEZ BENÍTEZ J. A.(\*\*), MOLINAROLI L.(\*), MUÑOZ-ANTÓN J.(\*\*)  
 (\*) Dipartimento di Energia - Politecnico di Milano, Italy, (\*\*) Universidad Politécnica de Madrid - Departamento de Ingeniería Energética, Spain
- 40 MEASURED AND SIMULATED BEHAVIOR OF HEAT PUMP IN LOW ENERGY BUILDING: SHORT CYCLING AND STORAGE IMPACT**  
SIMON E.(\*), PIRIOU C.(\*), CORGIER D.(\*), TEMEAC B.(\*\*)  
 (\*) MANASLU Ing., Savoie Technolac, France, (\*\*) Laboratoire Chimie Moléculaire, Genie des Procédés Chimiques et Énergétiques (CMGPCE, EA7341), CNAM, France
- 78 HEAT PUMP APPLICATION IN THE CHINESE MARKET, A REVIEW OF THE RECENT TEN YEARS**  
SU C., PALM B.  
*Department of Energy Technology, KTH, Sweden*
- 256 HEAT PUMP OPERATING WITH NH<sub>3</sub> OR CO<sub>2</sub> – A COMPARATIVE STUDY**  
 DOBROVICESCU A.(\*), SERBAN A.(\*\*), FILIPOIU C.(\*), NASTASE G.(\*\*), CHIRIAC F.(\*\*)  
 (\*) University POLITEHNICA of Bucharest, Romania, (\*\*) Faculty of Civil Engineering, University Transilvania Brasov, Romania
- 308 THERMOPHYSICAL PROPERTIES MEASUREMENTS AND NUMERICAL SIMULATION OF THE YEARLY YIELD OF A PARABOLIC TROUGH SOLAR COLLECTOR USING NANOFLUIDS**  
 COCCIA G.(\*), COLLA L.(\*\*), FEDELE L.(\*\*), DI NICOLA G.(\*), BOBBO S.(\*\*)  
 (\*) Department of Industrial Engineering and Mathematical Sciences, Marche Polytechnic University, Italy, (\*\*) Construction Technologies Institute, National Research Council, Italy
- 448 AN EXPERIMENTAL STUDY ON THE FROSTING CHARACTERISTICS OF HEAT PUMP SYSTEM IN PURE ELECTRIC VEHICLE**  
 ZHANG W., LI H., CHENG R., ZHENG X.  
*Beijing University of Technology, China*
- 468 FEASIBILITY STUDY OF A NOVEL DEFROSTING METHOD FOR AIR SOURCE HEAT PUMPS**  
 WANG F., LIANG C., YANG M., ZHANG X.  
*School of Energy and Environment, Southeast University, China*
- 556 PERFORMANCE MODELING AND MONITORING OF A HIGH-TEMPERATURE AIR-TO-WATER HEAT PUMP WITH THREE DIFFERENT HEATING SYSTEMS**  
DUMONT E., LÉPORE R., FRÈRE M.  
*Research Institute for Energy – University of Mons, Belgium*
- 642 DESIGN OF PHASE CHANGE THERMAL ENERGY STORES (PCM-TES) FOR RESIDENTIAL HEAT PUMP APPLICATIONS**  
MINIĆ I., HEWITT N., HUANG M.-J., RAMIREZ M.  
*University of Ulster, Centre for Sustainable Technologies, United Kingdom*

- 786 FUEL AND PRODUCT IN THE EXERGETIC ANALYSIS OF REFRIGERATION SYSTEMS**  
 DOBROVICESCU A.(\*), SERBAN A.(\*\*), PRISECARU T.(\*), APOSTOL V.(\*),  
 CHIRIAC F.(\*\*)  
 (\*) University POLITEHNICA of Bucharest, Romania, (\*\*) Faculty of Civil Engineering, University Transilvania Brasov, Romania
- 902 PERFORMANCE ANALYSIS OF HEAT PUMP WATER HEATING SYSTEM WITH CASCADE UTILIZATION OF WASTE HEAT FROM WASTEWATER**  
 HU P., ZHU W., CHEN Z.  
 Department of Thermal Science and Energy Engineering, University of Science and Technology of China, China

**S1-We-P**

- 22 ENERGY-SAVING POTENTIAL OF BUILDING ENVELOPE DESIGNS IN RESIDENTIAL HOUSES IN TROPICAL CLIMATE REGION**  
 SETIAWAN A. F.(\*), LIU P.-F.(\*\*), YU C.-W.(\*\*), LAI C.-M.(\*)  
 (\*) Department of Civil Engineering, National Cheng-Kung University, Taiwan, (\*\*) Department of Architecture, National Cheng-Kung University, Taiwan
- 42 ICE-STORAGE DEVICE APPLICATION IN COMMERCIAL BUILDINGS OF WUXI SINO-SWEDISH ECO-CITY**  
 SU C., SHAFQAT O., LUNDQVIST P.  
 Department of Energy Technology, KTH, Sweden
- 164 EFFECT OF INDOOR OPENING AREA ON CROSS-VENTILATION RATE IN APARTMENT BUILDING**  
 NISHIMURA Y.(\*), SAKAI K.(\*\*), YAMADA K.(\*\*)  
 (\*) Technical Research Institute, HASEKO Corporation, Japan, (\*\*) School of Science & Technology, Meiji University, Japan
- 265 EVALUATION OF THE ELECTRICAL ENERGY CONSUMPTIONS FOR A LOW-ENERGY BUILDING**  
 DAMIAN A., POPESCU R., BĂJENARU N., NICHITA M. T., DUMITRESCU R.  
 Technical University of Civil Engineering Bucharest, Romania
- 546 ENERGY MANAGEMENT SYSTEM UTILIZING EXHAUST HEAT RECOVERY ON DISTRIBUTED GENERATION IN SUPERMARKET AND RESTAURANT**  
 WATANABE T., SHIKANO T., BAE S., KATSUTA M.  
 Waseda University, Department of Modern Mechanical Engineering, Japan
- 660 COMPARISON BETWEEN MEASUREMENT AND WIND TUNNEL EXPERIMENT INTENDED FOR APARTMENT HOUSE**  
 YAMADA K.(\*), NISHIMURA Y.(\*\*), SAKAI K.(\*)  
 (\*) School of Science & Technology, Meiji University, Japan, (\*\*) Technical Research Institute, HASEKO Corporation, Japan

**ADSORPTION(2)**

**B1-We-3 Room 303**

Chairs: WANG R. (Shanghai Jiao Tong University, China)  
 JRIBI S. (Kyushu University, Japan)

- 13:30 940 MEASUREMENTS OF ADSORPTION/DESORPTION RATE OF A FILM ADSORBENT SYNTHESIZED ON HEAT TRANSFER PLATE CONTROLLED BY ADSORBENT TEMPERATURE IN WATER VAPOR**  
 OUCHI T., HAMAMOTO Y., MORI H.  
 Kyushu University, Japan
- 13:50 774 ADSORPTION KINETICS ANALYSIS OF WATER ON SILICA GEL IN TWO CONFIGURATIONS OF TUBULAR REACTORS**  
 MELO H.(\*), VODIANITSKAIA P. J.(\*), SANTOS J.(\*\*), GURGEL J. M.(\*\*\*)  
 (\*) Graduate Program in Mechanical Engineering, Federal University of Paraiba, PPGEM/CT/UFPB, Brazil, (\*\*) Department of Mechanical Production Engineering, Regional University of Cariri, Brazil, (\*\*\*) Federal University of Paraiba, Brazil
- 14:10 938 CAPILLARY CONDENSATION AND EVAPORATION OF WATER IN TWO-DIMENSIONAL HEXAGONAL MESOPOROUS SILICA**  
 HWANG J.(\*), SAKAMOTO K.(\*\*), YANAGIHARA H.(\*\*),  
 YAMASHITA K.(\*\*), KATAOKA S.(\*\*\*), ENDO A.(\*\*\*), DAIGUJI H.(\*)  
 (\*) Department of Mechanical Engineering, Graduate School of Engineering, The University of Tokyo, Japan, (\*\*) Department of Human and Engineered Environmental Studies, Graduate School of Frontier Sciences, The University of Tokyo, Japan, (\*\*\*) National Institute of Advanced Industrial Science and Technology (AIST), Japan
- 14:30 939 MOLECULAR DYNAMICS SIMULATION OF CAPILLARY EVAPORATION OF WATER ADSORBED ON HYDROPHILIC NANOPORES**  
 YAMASHITA K., DAIGUJI H.  
 Department of Mechanical Engineering, The University of Tokyo, Japan
- 14:50 385 NON EQUILIBRIUM ADSORPTION PERFORMANCE ANALYSIS OF THE ADSORPTION CYCLE FOR THE REFRIGERATING VEHICLES**  
 WANG L. W., ZHOU Z. S., GAO P., JIANG L., WANG R. Z.  
 Institute of Refrigeration and Cryogenics, Key Laboratory for Power Machinery and Engineering of M.O.E., Shanghai Jiao Tong University, China

**GREEN BUILDING(2)**

**S1-We-3 Room 313+314**

Chairs: DRUGHEAN L. G. (Technical University for Civil Engineering, Romania)  
 TANABE S. (Waseda University, Japan)

- 13:30 14 EVALUATING NATURAL VENTILATION EFFECTS OF ATRIUM IN A SUBTROPICAL VERNACULAR STREET-HOUSE IN TAIWAN**  
 SU Y.-M., HSIEH Y.-C., LIN Y.-C.  
 Department of Architecture, National Taipei University of Technology, Taiwan

**13:50 796 A STUDY ON THE ENVIRONMENTAL PERFORMANCE INTO STANDARD SYSTEM OF ELEMENTARY SCHOOL BUILDING BY WOOD-FRAME CONSTRUCTION METHOD -OUTLINE OF MODEL PLAN AND FIELD MEASUREMENTS OF THERMAL ENVIRONMENT IN WINTER-**

YAMAGUCHI H. (\*), KIMURA S. (\*\*), MATSUO K. (\*\*\*)  
MURAKOSHI M. (\*\*\*\*), KIMURA N. (\*\*\*\*\*)  
(\* Kanto-Gakuin University, Japan, (\*\* Arakawa ward office, Japan, (\*\*\*) Mitsui Home Components Co., Ltd., Japan, (\*\*\*\*) Atelierson Limited Co., Japan, (\*\*\*\*\*) Showa Women's University, Japan

**14:10 151 ROBUST OPERATION OF NET-ZERO AND POSITIVE ENERGY BUILDINGS WITH ENERGY COST MINIMIZATION**

OTAKE H., MURAI M., SAITO M., ASAKURA H., NOSAKA T., NISHIMURA N.  
TOSHIBA Corporation, Japan

**14:30 580 SMART METER ENABLED CONTROL FOR VARIABLE SPEED HEAT PUMPS TO INCREASE PV SELF-CONSUMPTION**

FISCHER D. (\*, \*\*), RAUTENBERG F. (\*), WIRTZ T. (\*),  
WILLE-HAUSSMANN B. (\*), MADANI H. (\*\*)  
(\* Fraunhofer ISE, Germany, (\*\* KTH Royal Institute of Technology, Sweden

**14:50 69 DYNAMIC THERMAL BEHAVIOR OF DOUBLE-SKIN FAÇADE AND ADJACENT INTERIOR COMFORT**

SERBAN A. (\*), DOBROVICESCU A. (\*\*), DRUGHEAN L. (\*\*\*)  
NASTASE G. (\*), ALEXANDRU A. (\*\*)  
(\* Transylvania University of Brasov, Romania, (\*\* University POLITEHNICA of Bucharest, Romania, (\*\*\*) Technical University of Civil Engineering, Romania

**EVAPORATIVE COOLING**

**E1-We-3 Room 411+412**

Chairs: PADALKAR A. S. (Flora Institute of Technology, Pune, India)

MIYAZAKI T. (Kyushu University, Japan)

**13:30 76 CRITIQUE OF IMPROVED PERFORMANCE OF AIR-COOLED CHILLERS WITH EVAPORATIVE COOLING**

YU F. W. (\*, \*\*), CHAN K. T. (\*\*), YANG J. (\*\*), SIT R. K. Y. (\*\*\*)  
(\* Hong Kong Community College, The Hong Kong Polytechnic University, China, (\*\* Department of Building Services Engineering, The Hong Kong Polytechnic University, China, (\*\*\*) CSA(M&E) Ltd., China

**13:50 590 EXPERIMENTAL INVESTIGATION OF NOCTURNAL COOLING ASSISTED EVAPORATIVE COOLING SYSTEM**

AGRAWAL N. (\*), BABAR N. (\*), SAWANT A. (\*\*)  
(\* Department of Mechanical Engineering, Dr. Babasaheb Ambedkar Technological University, India, (\*\* Aqua Therm System, India

**14:10 60 PRIMARY ENERGY EFFICIENCY ANALYSIS OF DIFFERENT SEPARATE SENSIBLE AND LATENT COOLING TECHNIQUES**

ABDELAZIZ O.  
Oak Ridge National Laboratory, United States

**14:30 149 EVALUATION OF VARIABLE REFRIGERANT FLOW (VRF) SYSTEMS PERFORMANCE IN ORNL'S FLEXIBLE RESEARCH PLATFORM (FRP)**

IM P. (\*), MUNK J. (\*), SONG K. (\*\*)  
(\* Oak Ridge National Laboratory, United States, (\*\* Samsung Electronics, South Korea

**CONDENSOR(1)**

**B2-We-3a Room 413**

Chairs: HONDA T. (Fukuoka University, Japan)

RADERMACHER R. (University of Maryland, United States)

**13:30 6 DISTRIBUTION FUNCTION FOR REVERSIBLE MICROCHANNEL HEAT EXCHANGER WITH VERTICAL HEADERS – CONSIDERING THE EFFECTS OF INLET CONDITIONS, GEOMETRIES AND FLUID PROPERTIES**

ZOU Y. (\*), HRNJAK P. (\*, \*\*)  
(\* Creative Thermal Solutions, Inc, United States, (\*\* University of Illinois at Urbana-Champaign, United States

**13:50 152 EXPERIMENTAL INVESTIGATION ON CONDENSATION HEAT TRANSFER OF R404A AND R407C OUTSIDE HORIZONTAL ENHANCED TUBES**

LIU C., OUYANG X.  
Institute of refrigeration and cryogenics, University of Shanghai for Science and Technology, China

**14:10 320 HEAT TRANSFER CHARACTERISTICS OF CONDENSING FLOW IN PLATE HEAT EXCHANGER (EFFECT OF CONDENSATE ON FLOW DISTRIBUTION)**

ASANO H. (\*), HONDA K. (\*), KAWAGUCHI T. (\*), TAKEDA N. (\*\*),  
KONDO M. (\*\*), NISHIMURA K. (\*\*)  
(\* Department of Mechanical Engineering, Kobe University, Japan, (\*\* Noritz Corp., Japan

**14:30 464 EXPERIMENTAL STUDY ON THE INFLUENCE OF THE AIR MALDISTRIBUTION ON THE PERFORMANCE OF A FINNED TUBE CONDENSER**

PISANO A. (\*), MARTÍNEZ BALLESTER S. (\*),  
CORBERÁN J. M. (\*), HIDALGO MONPEÁN F. (\*\*), ILLÁN GÓMEZ F. (\*\*),  
GARCÍA CASCALES J-R. (\*\*)  
(\* Universitat Politècnica de València, Institute for Energy Engineering, Spain, (\*\* Technical University of Cartagena, Thermal and Fluid Engineering Department, Spain

**14:50 629 POTENTIAL OF INTEGRATING THE AIR-BEARING HEAT EXCHANGER INTO A REFRIGERATOR CONDENSER**

LI M. (\*), DU Y. (\*), LEE H. (\*), HWANG Y. (\*), RADERMACHER R. (\*),  
JOHNSON T. (\*\*), KARIYA A. (\*\*)  
(\* Center for Environmental Energy Engineering, University of Maryland, United States, (\*\* Energy Systems Engineering and Analysis Group, Sandia National Laboratories, United States

**EJECTOR(1)**

**B2-We-3b Room 414+415**

Chairs: ICHIMIYA K. (University of Yamanashi, Japan)

YU J. (Xi'an Jiaotong University, China)

**13:30 3 THE MODIFIED FRICTIONAL LOSS EFFICIENCY CORRELATION IN AN EJECTOR 1-D NUMERICAL MODEL**

QI Z.  
Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University, China



- 13:50 45 STATE OF THE ART IN THE IDENTIFICATION OF TWO-PHASE TRANSONIC FLOW PHENOMENA IN TRANSCRITICAL CO<sub>2</sub> EJECTORS**  
 BANASIAK K.(\*), HAFNER A.(\*), PALACZ M.(\*\*)  
 (\*) SINTEF Energy Research, Norway, (\*\*) Silesian University of Technology, Poland
- 14:10 157 INVESTIGATION ON PERFORMANCE OF EJECTORS WITH ADJUSTABLE NOZZLES**  
 CHEN Z., DANG C., SHIMIZU A., HIHARA E.  
 Institute of Environmental Studies, Graduate School of Frontier Sciences, The University of Tokyo, Japan
- 14:30 195 STUDY ON THE USE OF EJECTORS FOR CAPACITY MODULATION AND PERFORMANCE IMPROVEMENT IN CO<sub>2</sub> COMMERCIAL REFRIGERATION SYSTEMS**  
 LAWRENCE N., ELBEL S.  
 Air Conditioning and Refrigeration Center, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, United States
- 14:50 787 ECOLOGICAL AND ENERGY EFFICIENCY ANALYSIS OF REASONABILITY APPLICATION OF EJECTOR AIR CONDITIONER COMPARED TO VAPOR COMPRESSION EQUIPMENT**  
 CHEN G.(\*), ZHELEZNY V.(\*\*), KHLIYEVA O.(\*\*), SHESTOPALOV K.(\*,\*\*), IERIN V.(\*\*)  
 (\*) Ningbo Institute of Technology, Zhejiang University, China, (\*\*) Odessa National Academy of Food Technologies, Ukraine

#### HEAT PUMPS AS PART OF THE ENERGY RECOVERY SYSTEM

##### E2-We-3 Room 416+417

Chairs: KAYUKAWA Y. (National Institute of Advanced Industrial Science and Technology, AIST, Japan)  
 ARNAS A. (Waseda University, Japan)

- 13:30 KEYNOTE THE ROLE OF HEAT PUMPS IN THE SMART ENERGY SYSTEMS**  
 LUNDQVIST P.  
 KTH, Department Energy Technology, Division Applied Thermodynamics and Refrigeration, Sweden
- 14:10 373 CFD SIMULATION AND EXPERIMENTAL INVESTIGATION PROCESS OF HEAT PUMP SYSTEM USING THERMOBANK AND EJECTOR FOR HEATING ROOM AND COLD STORAGE**  
 LE C. N.(\*), CHOI G.-I.(\*\*), OH J.(\*\*)  
 (\*) Graduate school, Chonnam National University, South Korea, (\*\*) Department of Refrigeration and Air Conditioning Engineering, Chonnam National University, South Korea
- 14:30 689 FACADE-INTEGRATED MVHR WITH SPEED-CONTROLLED MICRO-HEAT PUMP**  
 OCHS F.(\*), SIEGELE D.(\*), DERMENTZIS G.(\*), FEIST W.(\*\*)  
 (\*) University of Innsbruck, Austria, (\*\*) PHI, Germany
- 14:50 754 DEVELOPMENT AND CASE STUDY ON TOTAL OPTIMAL CONTROL SYSTEM FOR HEAT SOURCES**  
 YAMADA K., MURASAWA I.  
 TONETS Corporation, Japan

#### FREEZING AND CHILLING OF BOTANICAL PRODUCTS

##### C2-We-3 Room 418

Chairs: ALVAREZ G. (IRSTEA Refrigeration Research Unit, France)  
 TOLSTOREBROV I. (Norwegian University of Science and Technology, Norway)

- 13:30 153 THE IMPACT OF SLOW STEAMING ON REFRIGERATED EXPORTS FROM NEW ZEALAND**  
 CARSON J. K.(\*), KEMP R. M.(\*\*), EAST A. R.(\*\*\*), CLELAND D. J.(\*\*\*)  
 (\*) University of Waikato, New Zealand, (\*\*) AgResearch Ltd., New Zealand, (\*\*\*) Massey University, New Zealand
- 13:50 234 EFFECT OF DIFFERENT PACKAGING METHODS AND COLD STORAGE ON QUALITY AND SHELF LIFE OF RED SWEET PEPPER**  
 LIU S., WANG D., JIA L., ZHANG Z., JIN J.  
 Beijing Vegetable Research Center, Beijing Academy of Agriculture and Forestry Sciences, National Engineering Research Center for Vegetables, China
- 14:10 525 MINIMISING PRODUCT MOISTURE LOSS IN PROFESSIONAL SERVICE CABINETS**  
 MARQUES C.(\*,\*\*), HAMMOND E.(\*), WOOD I.(\*\*)  
 (\*) Department of Engineering, London South Bank University, United Kingdom, (\*\*) Adande Refrigeration, United Kingdom
- 14:30 505 MODELLING OF HEAT AND MASS TRANSFER PROCESSES IN REFRIGERATOR CRISPER FOR PREDICTING QUALITY AND SHELF LIFE OF VEGETABLES**  
 KOCATÜRK S.(\*), MET A.(\*), USLU I.(\*), KUDDUSİ L.(\*\*)  
 (\*) Arçelik A.Ş. R&D Center, Turkey, (\*\*) ITU – Istanbul Technical University Faculty of Mechanical Engineering, Turkey
- 14:50 841 PREDICTION OF DRYING RATE DURING FROZEN STORAGE OF COOKED RICE UTILIZING NOVEL METHOD OF MEASURING ADSORPTION ISOTHERM**  
 YAMADA R., FUKAZAWA T., WATANABE M., SUZUKI T.  
 Department of Food Science and Technology, Graduate School of Tokyo University of Marine Science and Technology, Japan

#### WORKSHOP: LOW GWP REFRIGERANTS: JOINT INTERNATIONAL RESEARCH OPPORTUNITIES

##### WS4-We-3/WS4-We-4 Room 301

Chair: AKASAKA R. (Kyushu Sangyo University, Japan)

#### WORKSHOP: IEA HPP ANNEX 41 – COLD CLIMATE HEAT PUMPS

##### WS5-We-3/WS5-We-4 Room 304

Chair: BAXTER V. (Oak Ridge National Laboratory, United States)

**ADSORPTION(3)****B1-We-4 Room 303**Chairs: HAMAMOTO Y. (*Kyushu University, Japan*)SEILER J. (*Institute of Technical Thermodynamics, RWTH Aachen University, Germany*)**15:30 430 EFFECT OF ACOUSTIC WAVE ON ENHANCEMENT OF MOISTURE ADSORPTION RATE OF SILICA-GEL**OKUBO K., MATSUDA S., UEDA Y., ENOKI K., AKISAWA A.  
*Tokyo University of Agriculture and Technology, Japan***15:50 374 THEORETICAL INVESTIGATION OF A NOVEL UNITARY SOLID DESICCANT AIR CONDITIONER**TU Y., GE T., WANG R., JIANG Y.  
*Institute of Refrigeration and Cryogenics, Shanghai Jiaotong University, China***16:10 364 PERFORMANCE PREDICATION OF DESICCANT COATED HEAT EXCHANGERS USING DIFFERENT COMPOSITE DESICCANT MATERIALS**ZHENG X., WANG R. Z., HU. L. M., GE T. S.  
*Institute of Refrigeration and Cryogenics, Key Laboratory for Power Machinery and Engineering of M.O.E., Shanghai Jiao Tong University, China***16:30 934 DESIGN AND MODELLING OF A STUDY PLATFORM FOR SOLID DESICCANT- VAPOUR KINETICS**CHOI S., HONG K., LEE D.-Y.  
*Center for Urban Energy, Green City Institute, Korea Institute of Science and Technology, South Korea***16:50 154 COUPLED HEAT AND MASS TRANSFER CHARACTERISTIC OF COMPRESSED AIR DEHUMIDIFICATION USING PRESSURIZED LIQUID DESICCANT**YIN Y., ZHENG B., ZHANG X.  
*School of Energy and Environment, Southeast University, China***CFD SIMULATION****S1-We-4 Room 313+314**Chairs: YANG A. (*National Taipei University of Technology, Taiwan*)SAKAI K. (*Meiji University, Japan*)**15:30 63 CFD SIMULATIONS AND MEASUREMENTS OF CARBON DIOXIDE TRANSPORT IN A PASSIVE HOUSE**SZCZEPANIK N., SCHNOTALE J.  
*Cracow University of Technology, Poland***15:50 233 3D CFD ANALYSIS OF EXHAUST FAN SYSTEM IN PAPER MILL FOR ENERGY SAVING**LEE K.-P.(\*), WU B.-H.(\*\*), YANG A.-S.(\*\*), HSU T.-S.(\*\*), LEE C.-L.(\*\*)  
(\* National Taipei University of Technology, Taiwan, (\*\* National Taipei University of Technology, Taiwan)**16:10 213 STUDY ON COMPARISON AND EXAMINATION OF DIFFERENT HVAC SYSTEMS IN THE KITCHEN OF CENTERS PROVIDING SCHOOL LUNCH**YAMADA T.(\*), YOSHINO H.(\*), OGITA S.(\*), FUJITA M.(\*\*)  
(\* TONETS Corporation, Japan, (\*\* Chubu Electric Power Company, Japan)**16:30 250 COMPARISON BETWEEN CONVENTIONAL AND LOCAL COMPUTER ROOM AIR-CONDITIONING SYSTEMS IN DATA CENTER BY CFD**TAKEUCHI J.(\*), KURABUCHI T.(\*\*), YOSHINO H.(\*\*\*), LEE S.(\*\*), INOUE Y.(\*\*\*\*)  
(\* TONETS Corporation, Japan, Graduate School of Tokyo University of Science, Japan, (\*\* Tokyo University of Science, Japan, (\*\*\*) TONETS Corporation, Japan, Tokyo City University, Japan, (\*\*\*\*) Graduate School of Tokyo University of Science, Japan)**EVAPORATOR / HX****E1-We-4 Room 411+412**Chairs: ABDELAZIZ O. (*Oak Ridge National Laboratory, United States*)NAKAYAMA H. (*Chubu Electric Power Co., Inc., Japan*)**15:30 227 A GENERAL STEADY STATE MATHEMATICAL MODEL FOR MULTI-UNIT AIR CONDITIONER SYSTEM BASED ON GRAPH THEORY**SUN H.(\*), REN T.(\*), DING G.(\*), GAO Y.(\*\*), SONG J.(\*\*)  
(\* Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University, China, (\*\* International Copper Association Shanghai Office, China)**15:50 247 TOWARDS "NUMERICAL EXPERIMENTATION": THE DEVELOPMENT OF A FULL SCALE CFD MODEL OF A ROOF-TOP AIR CONDITIONING EVAPORATOR TO PREDICT THE TWO PHASE CONJUGATE HEAT AND MASS TRANSFER**FAYSSAL I., MOUKALLED F.  
*American University of Beirut, Riad El-Solh, Lebanon***16:10 397 EXPERIMENTAL PERFORMANCE ASSESSMENT OF DC-INVERTER OPERATED SPLIT PACKAGED AIR CONDITIONER USING HC-290**MALI K.(\*), PADALKAR A.(\*\*), RANJAN R.(\*\*\*)  
(\* MAEER's MIT College of Engineering, India, (\*\* Flora Institute of Technology, India, (\*\*\*) Sinhgad College of Engineering, India)**16:30 886 EXPERIMENTAL INVESTIGATION OF DOUBLE ROWS LIQUID-VAPOR SEPARATION MICROCHANNEL CONDENSER**ZHONG T. M., CHEN Y., YANG Q. C., ZHENG W. X., LUO X. L., MO S. P., JIA L. S.  
*Faculty of Material and Energy, Guangdong University of Technology, China***16:50 194 EXPERIMENTAL INVESTIGATION OF TWO-PHASE EJECTOR LIQUID RECIRCULATION CYCLES WITH R410A**LAWRENCE N., ELBEL S.  
*Air Conditioning and Refrigeration Center, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, United States*

## CONDENSOR(2) / HEAT EXCHANGER

### B2-We-4a Room 413

Chairs: ASANO H. (Kobe University, Japan)

HWANG Y. (University of Maryland, United States)

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- 15:30 930 EFFECT OF GEOMETRY ON THE PERFORMANCE OF CO<sub>2</sub> GAS COOLER/CONDENSER AND ITS ASSOCIATED REFRIGERATION SYSTEM**  
GE Y., TASSOU S., TSAMOS K., SANTOSA I. D.  
RCUK National Centre for Sustainable Energy Use in Food Chains (CSEF), Institute of Energy Futures, College of Engineering, Design and Physical Sciences, Brunel University London, United Kingdom
- 15:50 880 DEVELOPMENT OF A MICRO-CHANNEL CONDENSER MODEL USING R1234YFAS WORKING FLUID AND COMPARED WITH R134A**  
ZHAO L.(\*), LIU W.(\*), YANG Z.(\*\*,\*)  
(\* Tongji University, China, (\*\* Shanghai Key Laboratory of Vehicle Aerodynamics and Vehicle Thermal Management System, Tongji University, China)
- 16:10 346 MULTI-SCALE ANALYSIS AND OPTIMIZATION OF TUBE SHAPES FOR AIR-TO-REFRIGERANT HEAT EXCHANGERS**  
BACELLAR D., AUTE V., RADERMACHER R.  
University of Maryland, United States
- 16:30 348 CFD-BASED CORRELATION DEVELOPMENT FOR AIR SIDE PERFORMANCE OF SMALL DIAMETER TUBE-FIN HEAT EXCHANGERS WITH WAVY FINS**  
BACELLAR D., AUTE V., RADERMACHER R.  
University of Maryland, United States
- 16:50 502 DIMPLE PLATE HEAT EXCHANGERS FOR A SEA-WATER CHILLER USING CO<sub>2</sub> AS REFRIGERANT, DESIGN AND TESTING**  
REKSTAD I. H.(\*), EIKEVIK T. M.(\*), JENSSEN S.(\*\*)  
(\* Department of Energy and Process Engineering, Norwegian University of Science and Technology (NTNU), Norway, (\*\* CADIO AS, Norway)

## EJECTOR(2)

### B2-We-4b Room 414+415

Chairs: TBD

POLONARA F. (Universita Politecnica delle Marche, Italy)

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- 15:30 321 DESIGN-THEORETICAL STUDY OF HYBRID CO<sub>2</sub> TRANSCRITICAL MECHANICAL COMPRESSION-EJECTOR COOLING CYCLE**  
CHEN G.(\*), IERIN V.(\*\*), SHESTOPALOV K.(\*\*,\*) , VOLOVYK O.(\*\*)  
(\* Ningbo Institute of Technology, Zhejiang University, China, (\*\* Ejector Refrigeration Technologies Center, Odessa National Academy of Food Technologies, Ukraine)
- 15:50 410 CFD-BASED SHAPE OPTIMISATION OF TWO-PHASE EJECTOR FOR R744**  
PALACZ M.(\*), SMOLKA J.(\*), FIC A.(\*), BULINSKI Z.(\*), NOWAK A. J.(\*), BANASIAK K.(\*\*), HAFNER A.(\*\*)  
(\* Institute of Thermal Technology, Silesian University of Technology, Poland, (\*\* SINTEF Energy, Norway)

- 16:10 569 EXPERIMENTAL INVESTIGATION OF AN EJECTOR-COMPRESSION CASCADE SYSTEM ACTIVATED WITH LOW-GRADE WASTE HEAT**  
NESREDDINE H.(\*), BENDAOUD A.(\*), AIDOUN Z.(\*\*), OUZZANE M.(\*\*), LE LOSTEC B.(\*)  
(\* Hydro-Québec, Canada, (\*\* CanmetENERGY, Natural Resources Canada, Canada)
- 16:30 929 BINARY LIQUID-RING EJECTOR REFRIGERATION SYSTEM**  
TANG J.(\*\*,\*) , ZHANG Z.(\*\*,\*) , LI L.(\*\*,\*) , ZHOU Y.(\*), WANG J.(\*), LIU J.(\*), ZHU W.(\*)  
(\* Key Laboratory of Cryogenics, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, China, (\*\* University of Chinese Academy of Sciences, China, (\*\*\*) Tianjin University of Commerce, China)
- 16:50 98 EXPERIMENTAL STUDY OF AN EJECTOR-EXPANSION VAPOR COMPRESSION REFRIGERATION CYCLE APPLIED IN DOMESTIC REFRIGERATOR-FREEZERS**  
WANG X.(\*), YU J.(\*), GANG Y.(\*), BAI L.(\*\*), WEI B.(\*\*), CHEN K.(\*\*), SHANG D.(\*\*)  
(\* Department of Refrigeration & Cryogenic Engineering, School of Energy and Power Engineering, Xi'an Jiaotong University, China, (\*\* Hefei Meiling Co., Ltd., China)

## RESIDENTIAL AND COMMERCIAL HEAT-PUMP SYSTEMS(1)

### E2-We-4 Room 416+417

Chairs: JEONG J. (Waseda University, Japan)

UDAGAWA Y. (NTT FACILITIES, INC., Japan)

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- 15:30 20 EXPERIMENTAL VALIDATION OF ON-FIELD MEASUREMENT METHOD FOR A HEAT PUMP SYSTEM WITH INTERNAL HEAT EXCHANGER**  
GOOSSENS M.(\*\*,\*) , RIVIERE P.(\*), TEUILLIERES C.(\*\*), MARCHIO D.(\*), TRAN C.-T.(\*)  
(\* Ecole des Mines-ParisTech, Centre for Energy Efficiency Systems (CES), France, (\*\* EDF R&D, Energy in Buildings and Territories Department (ENERBAT), France)
- 15:50 61 EXPERIMENTAL INVESTIGATION ON TRANSCRITICAL CO<sub>2</sub> HEAT PUMP SYSTEM WITH EJECTOR IN OFF-DESIGN CONDITIONS**  
WEI J., CHEN Q., TANG L., CHEN G., QI H., LI T.  
Institute of Refrigeration and Cryogenics, Zhejiang University, China
- 16:10 96 INTEGRATION OF HEAT PUMP AND HEAT RECOVERY OF CENTRAL AC SYSTEM FOR ENERGY USE REDUCTION OF HOTEL INDUSTRY**  
SUAMIR I. N.(\*), ARDITA I. N.(\*), DEWI N. I. K.(\*\*)  
(\* Mechanical Engineering Department, Bali State Polytechnic, Indonesia, (\*\* Department of Business Administration, Bali State Polytechnic, Indonesia)
- 16:30 104 THE REFRIGERANT TWO-PHASE FLOW VOID FRACTION IN THE VICINITY OF A SHARP RETURN BEND**  
DE KERPEL K., DE SCHAMPHELEIRE S., KAYA A., BILLIET M., DE PAEPE M.  
Ghent University - UGent, Belgium

- 16:50 95 TAGUCHI AND UTILITY CONCEPT OPTIMIZATION OF PARABOLIC SOLAR COLLECTOR ASSISTED GROUND COUPLED HEAT PUMP SYSTEM FOR SPACE HEATING APPLICATIONS**  
 VERMA V., MURUGESAN K.  
 Department of Mechanical and Industrial Engineering, Indian Institute of Technology Roorkee, India

**WORKSHOP: LOW GWP REFRIGERANTS: JOINT INTERNATIONAL RESEARCH OPPORTUNITIES**  
**WS4-We-3/WS4-We-4 Room 301**  
 Chair: AKASAKA R. (Kyushu Sangyo University, Japan)

**WORKSHOP: IEA HPP ANNEX 41 – COLD CLIMATE HEAT PUMPS**  
**WS5-We-3/WS5-We-4 Room 304**  
 Chair: BAXTER V. (Oak Ridge National Laboratory, United States)

## THURSDAY, AUGUST 20

8:30-10:10

### TRANSPORT PROPERTIES

#### B1-Th-1a Room 301

Chairs: YANG Z. (Tianjin University, China)  
 MATSUMOTO T. (Idemitsu Kosan Co., Ltd., Japan)

- 8:30 684 VISCOSITY MEASUREMENT OF LOW GWP REFRIGERANTS WITH A TANDEM CAPILLARY TUBES METHOD**  
 KARIYA K., MORI S., MIYARA A.  
 Department of Mechanical Engineering, Saga University, Japan
- 8:50 476 VISCOSITY MEASUREMENTS OF R 32, R 134A AND R 1234ZE(Z)**  
 MATSUGUCHI A., KAGAWA N.  
 Department of Mechanical Systems Engineering, National Defense Academy, Japan
- 9:10 428 ACCURATE DETERMINATION OF VISCOSITY AND SURFACE TENSION OF BINARY MIXTURES OF R1234YF AND R32 UNDER SATURATED CONDITIONS BY SURFACE LIGHT SCATTERING**  
 BI S., CHUI J., MA L., WU J.  
 Key Laboratory of Thermo-Fluid Science and Engineering, Ministry of Education, School of Energy and Power Engineering, Xi'an Jiaotong University, China
- 9:30 785 CORRELATE VISCOSITY AND SOLUBILITY OF LUBRICANT-REFRIGERANT MIXTURE BY USING PSEUDO-IDEAL-SOLUTION MODEL**  
 HUNG J.-I., TSAIH J.-S., TANG H.-H.  
 Patech Fine Chemicals Co., Ltd., Taiwan
- 9:50 683 THERMAL CONDUCTIVITY MEASUREMENT OF LOW GWP REFRIGERANTS WITH HOT-WIRE METHOD**  
 ISHIDA H.(\*), MORI S.(\*), KARIYA K.(\*\*), MIYARA A.(\*\*)  
 (\*) Graduate School of Science and Engineering, Saga University, Japan,  
 (\*\*) Department of Mechanical Engineering, Saga University, Japan

### ABSORPTION(1)

#### B1-Th-1b Room 303

Chairs: SAHA B. B. (Kyushu University, Japan)  
 YAMAGUCHI S. (Waseda University, Japan)

- 8:30 25 HEAT TRANSFER CHARACTERISTIC IN A VERTICAL RISER TUBE AT SUB-ATMOSPHERIC PRESSURE**  
 TRINH D. Q., ALBERS J., ZIEGLER F.  
 Technical University of Berlin, Institute of Energy Engineering, Germany
- 8:50 325 PREDICTION AND EXPERIMENTAL INVESTIGATION OF HEAT AND MASS TRANSFER CHARACTERISTICS OF A HORIZONTAL TUBE BUNDLE ABSORBER**  
 OLBRIGHT M., LUKE A.  
 University of Kassel, Institute of Technical Thermodynamics, Germany
- 9:10 804 EFFECT OF CONCENTRATION ON FALLING FILM ABSORPTION HEAT AND MASS TRANSFER OF LIBR SOLUTION ON HORIZONTAL ENHANCED HEAT TRANSFER TUBE**  
 TAKAHASHI H., IWAMOTO H.  
 Kobelco & Materials Copper Tube, LTD., Japan
- 9:30 745 STUDY ON CO<sub>2</sub> BUBBLE ABSORPTION AND VISUALIZATION IN NANOFLUIDS**  
 LEE J. W., LEE J. H., KANG Y. T.  
 Korea University, South Korea
- 9:50 315 EFFECTS OF CNT ON IMPROVEMENT OF HEAT AND MASS TRANSFER CHARACTERISTICS OF LIBR AQUEOUS SOLUTION CONTAINING ALCOHOL ADDITIVES**  
 SUN H.(\*), DANG C.(\*\*), LI K.(\*), MA G.(\*)  
 (\*) Department of Refrigeration and Cryogenics, College of Environmental and Energy Engineering, Beijing University of Technology, China, (\*\*) Department of Human and Engineered Environmental Studies, Graduate School of Frontier Sciences, The University of Tokyo, Japan

### BUILDING SIMULATIONS

#### S1-Th-1 Room 313+314

Chairs: RIGOLA J. (Universitat Politècnica de Catalunya-BarcelonaTech, Spain)  
 AKIMOTO T. (Shibaura Institute of Technology, Japan)

- 8:30 254 MEMBRANE ENERGY EXCHANGERS, EVALUATION OF A FROST-FREE DESIGN AND ITS PERFORMANCE FOR VENTILATION IN COLD CLIMATES**  
 LIU P.(\*), ALONSO M. J.(\*\*), MATHISEN H. M.(\*)  
 (\*) Department of Energy and Process Engineering, NTNU, Norway, (\*\*) SINTEF Building and Infrastructure, Norway
- 8:50 676 COMPARISON OF HEAT EXCHANGE RATES BETWEEN STRAIGHT AND SLINKY HORIZONTAL GROUND HEAT EXCHANGER**  
 SELAMAT S.(\* \*\*\*), MIYARA A.(\*\*), KARIYA K.(\*\*)  
 (\*) Graduate School of Science and Engineering, Saga University, Japan, (\*\*) Department of Mechanical Engineering, Saga University, Japan, (\*\*\*) School of Environmental Engineering, University Malaysia Perlis, Malaysia
- 9:10 928 DEVELOPMENT AND APPLICATION OF GROUND HEAT EXCHANGER MODEL USING RESPONSE FACTOR METHOD**  
 ONO E., ARAI Y., SHIOYA M., MIURA K.  
 Kajima Technical Research Institute, Japan

**9:30 862 ENERGY SIMULATION OF A SINGLE FAMILY DWELLING WITH A MODULAR OBJECT-ORIENTED TOOL**  
CAPDEVILA R.(\*), CHIVA J.(\*), LÓPEZ J.(\*), RIGOLA J.(\*),  
LEHMKUHL O.(\*,\*\*)  
(\* ) *Universitat Politècnica de Catalunya-BarcelonaTech, Spain, (\*\*)*  
*Termofluids S.L., Spain*

**9:50 13 DESIGN STUDIES ON BUILDING-INTEGRATED WIND ENERGY USING CFD SIMULATIONS**  
YANG A.-S., WANG W.-S., WANG P.-C., WANG R.-J.  
*Department of Energy and Refrigerating Air-Conditioning Engineering, National Taipei University of Technology, Taiwan*

#### REFRIGERANT

##### E1-Th-1 Room 411+412

Chairs: TAIRA S. (*Daikin Industries, Ltd., Japan*)

CHEN Y. (*Guangdong University of Technology, China*)

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**8:30 73 PERFORMANCE COMPARISON OF OPTIMIZED R410A REPLACEMENTS**  
KUJAK S., SCHULTZ K.  
*Ingersoll Rand, United States*

**8:50 75 ASSESSMENT OF NEXT GENERATION REFRIGERANT R513A TO REPLACE R134A FOR CHILLER PRODUCTS**  
SCHULTZ K., KUJAK S., MAJURIN J.  
*Ingersoll Rand, United States*

**9:10 400 PERFORMANCE ASSESSMENT OF AIR CONDITIONER USING HFC-161**  
PADALKAR A.(\*), MALI K.(\*\*), KADAM A.(\*), DEVOTTA S.(\*\*\*)  
(\* ) *Flora Institute of Technology, India, (\*\*)* MAEER's MIT College of Engineering, India, (\*\*\*) *Chemical and Environmental Engineering Consultant, India*

**9:30 668 NOVEL REDUCED GWP REFRIGERANT COMPOSITIONS FOR STATIONARY AIR CONDITIONING**  
HUGHES J., LECK T.  
*DuPont Chemicals and Fluoroproducts, United States*

#### EVAPORATOR(1)

##### B2-Th-1a Room 413

Chairs: KOJIMA M. (*Tokyo University of Marine Science and Technology, Japan*)

KIM Y. (*Korea University, South Korea*)

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**8:30 27 PLATE HEAT EXCHANGER USED AS EVAPORATORS**  
ILIE A.(\*), DRUGHEAN L.(\*), ŞERBAN A.(\*\*), CHIRIAC F.(\*),  
DOBROVICESCU A.(\*\*\*)  
(\* ) *Technical University for Civil Engineering, Romania, (\*\*)* Transilvania University of Brasov, Romania, (\*\*\*) *Bucharest Politehnica University, Romania*

**8:50 36 EXPERIMENTAL INVESTIGATIONS ON PERFORMANCE OF EVAPORATOR AND CONDENSER OF R410A INSIDE A NOVEL BRAZED PLATE HEAT EXCHANGER**  
WEI W., TUCKER J., XU Y.  
*Danfoss Heat Exchanger R&D Centre, China*

**9:10 216 EXPERIMENTAL STUDY ON PARRALLEL FLOW EVAPORATORS USED IN ROOF TOP BUS AIR CONDITIONINGS**  
LIANG Y., CHEN J.  
*Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University, China*

**9:30 264 FROM LUMPED TO FULL SCALE MODELING APPROACH: ON THE USE OF COMPUTATIONAL FLUID DYNAMICS TO MODEL HEAT AND MASS TRANSFER PROCESSES IN WATER COOLED EVAPORATOR**  
FAYSSAL I., MOUKALLED F.  
*American University of Beirut, Riad El-Solh, Lebanon*

**9:50 459 INVESTIGATION OF R32 SPOT-EVAPORATORS**  
KNIPPING T.(\*), MUELLER T.(\*), ARNEMANN M.(\*\*), HESSE U.(\*\*\*)  
(\* ) *Karlsruhe UAS, Institute of Materials and Processes (IMP), Germany, (\*\*)* Karlsruhe UAS, Institute of Refrigeration, Air Conditioning and Environmental Engineering (IKKU), Germany, (\*\*\*) *TU Dresden, BITZER Chair of Refrigeration, Cryo- and Compressor Technology, Georg-Schumann-Bau, Germany*

#### EJECTOR(3)

##### B2-Th-1b Room 414+415

Chairs: TBD

ELBEL S. (*University of Illinois, United States*)

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**8:30 471 ANALYSIS OF AN EJECTOR VAPOUR COMPRESSION CYCLE FOR HOUSEHOLD REFRIGERATOR**  
ARTECONI A.(\*), CIRIACHI G.(\*\*), ACAR M.(\*\*\*), BILGIN N.(\*\*\*),  
POLONARA F.(\*\*)  
(\* ) *Università e-Campus, Italy, (\*\*)* Dipartimento di Ingegneria Industriale e Scienze Matematiche, Università Politecnica delle Marche, Italy, (\*\*\*) *Indesit Company, Italy*

**8:50 297 WASTE HEAT DRIVEN COOLING BY VAPOR JET EJECTOR**  
ELBEL S.(\*,\*\*), WUJEK S.(\*), HRNJAK P.(\*,\*\*)  
(\* ) *Creative Thermal Solutions, Inc., United States, (\*\*)* University of Illinois at Urbana-Champaign, Department of Mechanical Science and Engineering, United States

**9:10 89 THEORETICAL ANALYSIS ON A NOVEL HYBRID REFRIGERATION CYCLE WITH TWO EJECTORS AND INTERNAL HEAT EXCHANGER FOR DOMESTIC REFRIGERATOR-FREEZERS**  
BAI T., YAN G., YU J.  
*Department of refrigeration and Cryogenic engineering, School of Energy and Power Engineering, Xi'an Jiaotong University, China*

**9:30 909 OPERATION AND EXERGY ANALYSIS OF A SUPERSONIC R134A EJECTOR BY LOW-REYNOLDS NUMBER TURBULENCE MODEL**  
CROQUER S.(\*), PONCET S.(\*), AIDOUN Z.(\*\*)  
(\* ) *Université de Sherbrooke, Faculté de génie, Département de génie mécanique, Canada, (\*\*)* CETC-Varenes, Natural Resources Canada, Canada

**9:50 768 NEXT GENERATION R744 REFRIGERATION TECHNOLOGY FOR SUPERMARKETS**  
HAFNER A.(\*), FREDSLUND K.(\*\*), BANASIAK K.(\*)  
(\* ) *SINTEF Energy Research, Kolbjørn Hejes vei 1D, 7465 Trondheim, Norway, (\*\*)* Danfoss A/S, Denmark

## RESIDENTIAL AND COMMERCIAL HEAT-PUMP SYSTEMS(2)

### E2-Th-1 Room 416+417

Chairs: SAITO K. (Waseda University, Japan)

NAKAYAMA H. (Chubu Electric Power Co., Inc., Japan)

#### 8:30 KEYNOTE ABSORPTION HEAT EXCHANGERS FOR LONG DISTANCE HEAT TRANSPORTATION

JIANG Y., Xie X.

Building Energy Research Center, Tsinghua University, China

#### 9:10 259 HIGH TEMPERATURE HEAT PUMPS FOR SEASONAL THERMAL ENERGY STORAGE AND DISTRICT HEATING SYSTEMS

HEWITT N., HUANG M., RAMIREZ M.

Centre for Sustainable Technologies, University of Ulster, United Kingdom

#### 9:30 307 AN EXPERIMENTAL STUDY ON THE OPERATING PERFORMANCES OF THE COUPLED RADIATION PANELS WITH HOUSEHOLD REPLACEMENT FRESH AIR SYSTEM

QU M., CHEN J., QIAN Y., PAN J.

School of Environment & Architecture, University of Shanghai for Science & Technology, China

#### 9:50 316 PERFORMANCE ASSESSMENT AND COMPARISON OF THERMALLY DRIVEN HEAT PUMPS SYSTEMS

MOUNIER V., MENDOZA L. C., SCHIFFMANN J.

Laboratory of Applied Mechanical Design (LAMd), Ecole Polytechnique Fédérale de Lausanne, EPFL, Switzerland

## WORKSHOP: EVALUATING LOW-GWP REFRIGERANTS FOR AIR-CONDITIONING INDUSTRY IN HIGH AMBIENT TEMPERATURE COUNTRIES WS6-Th-1 Room 304

Chair: ELTALOUNY A. (UNEP, Bahrain)

## THURSDAY, AUGUST 20

## 10:30-12:10

### BOILING(1)

#### B1-Th-2a Room 301

Chairs: HE G. (Huazhong University of Science and Technology, China)

INOUE N. (Tokyo University of Marine Science and Technology, Japan)

#### 10:30 112 POOL BOILING HEAT TRANSFER OF LOW GWP REFRIGERANTS R1234ze(E), R1234ze(Z) AND R1233zd(E) ON A HORIZONTAL PLANE TUBE

NAGATA R.(\*), NII N.(\*), KONDOU C.(\*\*), KOYAMA S.(\*,\*\*\*)

(\*) Kyushu University, Interdisciplinary Graduate School of Engineering Science, Japan, (\*\*) Nagasaki University, Graduate School of Engineering, Japan, (\*\*\*) Kyushu University, International Institute for Carbon-Neutral Energy Research, Japan

#### 10:50 581 TEST RIG FOR EXPERIMENTAL EVALUATION OF SPRAY EVAPORATION HEAT TRANSFER COEFFICIENTS

PARDIÑAS Á. Á., FERNÁNDEZ-SEARA J., DIZ R.

Área de Máquinas y Motores Térmicos, Universidade de Vigo, Spain

#### 11:10 583 EXPERIMENTAL STUDY ON HEAT TRANSFER COEFFICIENTS OF SPRAY EVAPORATION AND POOL BOILING ON PLAIN TUBES

PARDIÑAS Á. Á., FERNÁNDEZ-SEARA J., DIZ R.

Área de Máquinas y Motores Térmicos, Universidade de Vigo, Spain

#### 11:30 776 A STUDY OF POOL BOILING HEAT TRANSFER ON HORIZONTAL TUBES IN R-245fa/OIL MIXTURE

CHIEN L.-H., TSAI Y.-L., CHANG C.-H.

Department of Energy and Refrigerating Air-conditioning Engr., National Taipei University of Technology, Taiwan

### ABSORPTION(2)

#### B1-Th-2b Room 303

Chairs: KANG Y. (Korea University, South Korea)

TAKAHASHI H. (Kobelco & Materials Copper Tube, Ltd., Japan)

#### 10:30 49 COMPARISON OF A NEW DESIGNED RESORPTION REFRIGERATION SYSTEM WITH CONVENTIONAL ABSORPTION SYSTEMS

GRUND M.(\*), HESSE U.(\*), WEIMER T.(\*\*), RÜHLING K.(\*)

(\*) Technische Universität Dresden, Germany, (\*\*) Engineering Services Dr.-Ing. Thomas Weimer, Germany

#### 10:50 466 LOCAL ENTROPY GENERATION ANALYSIS OF WATER VAPOUR ABSORPTION IN A LiBr-H<sub>2</sub>O SOLUTION FILM, OVER A HORIZONTAL COOLED TUBE

GIANNETTI N.(\*), ROCCHETTI A.(\*\*), SAITO K.(\*), YAMAGUCHI S.(\*)

(\*) Department of Applied Mechanics and Aerospace Engineering, Waseda University, Japan, (\*\*) DIEF - Department of Industrial Engineering of Florence, Italy

#### 11:10 578 ASSESSMENT OF VAPOR-LIQUID EQUILIBRIUM MODELS FOR IONIC LIQUIDS BASED ABSORPTION SYSTEMS

WANG M., INFANTE FERREIRA C. A.

Delft University of Technology, Process and Energy Department, Netherlands

#### 11:30 611 HYBRID COMPRESSION HEAT PUMPING CYCLES BASED PLANTS

STAICOVICI M.-D. N.

S.C. Varia Energia S.R.L. & S.C. Incorporate Power-Absorption Engineering S.R.L., Romania

### HVAC SYSTEM

#### S1-Th-2 Room 313+314

Chairs: HAMMAD M. A. (University of Jordan, Jordan)

NAGAI T. (Tokyo University of Science, Japan)

#### 10:30 114 REDUCTION METHOD OF AIR CONDITIONING LOAD OF PLANT FACTORY BASED ON LIGHTING EXPERIMENT AND PLANT MODEL ANALYSIS

MORIUCHI K.(\*), UEDA Y.(\*), YOSHIDA A.(\*\*), KINOSHITA S.(\*\*)

(\*) Seiken Co., Ltd., Japan, (\*\*) Osaka Prefecture University, Japan

#### 10:50 732 HIGH-TEMPERATURE COOLING & LOW-TEMPERATURE HEATING AC SYSTEM EVALUATION OF ENERGY SAVING IN AN OFFICE IN TOKYO

URANO K.(\*), SUMITA A.(\*\*)

(\*) Engineering Division, KIMURA KOKI CO., LTD., Japan, (\*\*) Spreme Adviser, KIMURA KOKI CO., LTD., Japan

**11:10 699 THE EVALUATION OF RADIANT CONDITIONERS**  
YAMAMOTO T.(\*), NEMOTO K.(\*), SHIMIZU K.(\*\*), ONODA H.(\*),  
NAGATA K.(\*)  
(\* Waseda University, Japan, (\*\* Environmental Reserch Institute,  
Japan

## VRF

### E1-Th-2 Room 411+412

Chairs: TBD

KANEKO A. (SANDEN ADVANCED TECHNOLOGY CORPORATION, Japan)

**10:30 51 EVALUATION OF VRF SYSTEM WITH MULTI INDOOR UNITS BY EXPERIMENTAL STUDY AND SIMULATION ANALYSIS**  
MATSUMOTO K.(\*), OHNO K.(\*\*), SAITO K.(\*\*)  
(\* Kansai Electric Power Co., Inc., Japan, (\*\* School of Fundamental Science and Engineering, Waseda University, Japan

**10:50 298 SIMULATION AND APPLICATION STUDY OF VRV SYSTEM IN OFFICE BUILDING**  
ZHAO D.(\*), ZHONG M.(\*\*, ZHANG X.(\*)  
(\* Institute of HVAC&Gas Engineering, Tongji University, Shanghai, 201804, China, (\*\* Daikin (China) Investment Co., Ltd, China

**11:10 224 CAPACITY ALLOCATION STRATEGY FOR MULTI-MODULE OUTDOOR UNITS IN VARIABLE REFRIGERANT FLOW AIR CONDITIONING SYSTEM**  
LI Z., SHI W., WANG B., LI X.  
Department of Building Science, Tsinghua University, China

**11:30 350 SIMULATION AND EXPERIMENTAL VALIDATION OF THE VARIABLE REFRIGERANT FLOW SYSTEM UNDER THE COOLING CONDITIONS**  
HE C., JIN X., DU Z., ZHU Y., YOU T.  
School of Mechanical Engineering, Shanghai Jiao Tong University, China

## EVAPORATOR(2)

### B2-Th-2a Room 413

Chairs: JIGE D. (Tokyo University of Marine Science and Technology, Japan)

TBD

**10:30 542 ESTABLISHMENT OF AN EXPERIMENTAL DESIGN IN THE CONTEXT OF WATER VAPORIZATION OCCURING ON A PLATE CROSS SECTION**  
GIRAUD F.(\*\*, TOUBLANC C.(\*), RULLIERE R.(\*\*), BONJOUR J.(\*\*),  
CLAUSSE M.(\*\*)  
(\* Laboratoire de Chimie moléculaire, génie des procédés chimiques et énergétiques (CMGPCE – EA 21), CNAM, ICENER, case 2D3P20, France, (\*\* Université de Lyon, CNRS, INSA-Lyon, CETHIL, UMR5008, France

**10:50 548 PRELIMINARY EXPERIMENTAL INVESTIGATION ON WATER BOILING PHENOMENA IN A LIQUID LAYER AT SUBATMOSPHERIC PRESSURE**  
GIRAUD F.(\*\*, RULLIÈRE R.(\*), TOUBLANC C.(\*\*), CLAUSSE M.(\*),  
BONJOUR J.(\*)  
(\* Université de Lyon, CNRS, INSA-Lyon, CETHIL, UMR5008, France, France, (\*\* Laboratoire de Chimie moléculaire, génie des procédés chimiques et énergétiques (CMGPCE – EA 21), CNAM, ICENER, case 2D3P20, France

**11:10 550 EFFECT OF LIQUID/VAPOUR MALDISTRIBUTION ON THE PERFORMANCE OF PLATE HEAT EXCHANGER EVAPORATORS**  
JENSEN J. K.(\*), KÆRN M. R.(\*), OMMEN T.(\*), MARKUSSEN W. B.(\*),  
REINHOLDT L.(\*\*), ELMEGAARD B.(\*)  
(\* Department of Mechanical Engineering, Technical University of Denmark, Denmark, (\*\* Danish Technological Institute, Denmark

**11:30 591 DESIGN SENSITIVITY ANALYSIS OF A DIRECT EVAPORATOR FOR LOW-TEMPERATURE WASTE HEAT RECOVERY ORCS USING VARIOUS FLOW BOILING HEAT TRANSFER CORRELATIONS**  
KAYA A., LAZOVA M., LECOMPTE S., DE PAEPE M.  
Ghent University, Department of Heat, Combustion and Fluid Dynamics, Belgium

**11:50 830 A COMPARATIVE STUDY ON ROOM AIR CONDITIONER PERFORMANCE OF FINNED-TUBE EVAPORATOR AND THE MIRCO-CHANNEL EVAPORATOR UNDER OPTIMAL THROTTLING CONDITION**  
ZHANG W., ZHANG Z., HUANG H., YAO Y.  
Engineering Laboratory of Energy System Conversion and Emission Reduction of Jiangsu Province, School of Energy and Mechanical Engineering, Nanjing Normal University, China

## EJECTOR(4) / DESICCANT

### B2-Th-2b Room 414+415

Chairs: ENDO N. (National Institute of Advanced Industrial Science and Technology, AIST, Japan)

CHEN G. (Ningbo Institute of Technology, Zhejiang University, China)

**10:30 609 AN EXPERIMENTAL STUDY OF EJECTORS SUPPORTED BY CFD**  
HAKKAKI-FARD A., POIRIER M., AIDOUN Z., OUZZANE M., GIGUÈRE D.  
CanmetENERGY-Varenes, Natural Resources Canada, Canada

**10:50 421 PERFORMANCE ANALYSIS OF A SOLAR DESICCANT AIR CONDITIONING SYSTEM**  
FENG S.(\*), WANG Z.(\*\*), DANG C.(\*\*), HIHARA E.(\*\*)  
(\* Nanjing University of Aeronautics and Astronautics, China, (\*\* The University of Tokyo, Japan

**11:10 860 INVESTIGATION OF A LIQUID DESICCANT SYSTEM FOR AIR DEHUMIDIFICATION WORKING WITH AN IONIC LIQUID IN A TWO-STAGE REFRIGERATION SYSTEM FOR COLD STORES**  
ZEGENHAGEN M. T., KÜHN R., MEYER T., RICART C., ZIEGLER F.  
Technische Universität Berlin, Germany

## RESIDENTIAL AND COMMERCIAL HEAT-PUMP SYSTEMS(3)

### E2-Th-2 Room 416+417

Chairs: TOJO K. (TOJO R&D Design Office / Waseda University, Japan)

TBD

**10:30 330 OPTIMIZATION OF CO<sub>2</sub> HEAT PUMP SYSTEM FOR SIMULTANEOUS HEATING AND COOLING APPLICATIONS**  
DHARKAR S., KURTULUS O., GROLL E., YAZAWA K.  
School of Mechanical Engineering, Purdue University, 3071 Herrick Laboratories, Purdue University, United States

- 10:50 393 DEVELOPMENT OF A COLD CLIMATE HEAT PUMP USING TWO-STAGE COMPRESSION**  
 SHEN B., RICE C. K., ABDELAZIZ O., SHRESTHA S.  
*Building Technologies Research and Integration Center, Oak Ridge National Lab, United States*
- 11:10 561 CASCADE CYCLE HIGH-TEMPERATURE HEAT PUMP: MODELLING AND VALIDATION**  
 DUMONT E., LEPORE R., BOIVIN T., FRERE M.  
*Research Institute for Energy – University of Mons, Belgium*
- 11:30 567 PERFORMANCE EVALUATION OF A GROUND SOURCE VARIABLE REFRIGERANT FLOW (VRF) SYSTEM FOR A UNIVERSITY BUILDING IN COLD CLIMATE**  
 IM P., LIU X.  
*Oak Ridge National Laboratory, United States*
- 11:50 584 TEST CASES FOR HARDWARE IN THE LOOP TESTING OF AIR TO WATER HEAT PUMP SYSTEMS IN A SMART GRID CONTEXT**  
 FISCHER D.(\*,\*\*), WIRTZ T.(\*), ZERBE K. D.(\*), WILLE-HAUSSMANN B.(\*), MADANI H.(\*\*)  
 (\*), *Fraunhofer ISE, Germany, (\*\*), KTH Royal Institute of Technology, Sweden*

**WORKSHOP: CURRENT GLOBAL STATUS OF TRANSITION TO LOWER GWP ALTERNATIVES BY LAWS AND REGULATIONS**

**WS7-Th-2 Room 304**

Chair: SATO K. (*JRAIA, Japan*)

**WORKSHOP: DATABASE AND SIMULATION TOOLS FOR REFRIGERATION ON COLD CHAIN: FRISBEE DATABASE AND TOOLS**

**WS8-Th-2 Room 418**

Chair: ALVAREZ G. (*IRSTEA, France*)

**THURSDAY, AUGUST 20**

**12:10-13:30**

**POSTER SESSION**

**Room 315**

**A1-Th-P**

- 19 APPLICATION OF ENVIRONMENT MIXED REFRIGERANTS IN A SMALL CRYOGENIC DEVICE**  
 QU Y., WANG F., YU D., OU J., MENG Z., ZHANG Z.  
*University of Shanghai for Science and Technology, Institute of Refrigeration and Cryogenic Technology, China*
- 239 CREATION OF CRYOGENIC TESTING BENCH FOR SUPERCONDUCTING MAGNETS OF NICA AND SIS100 PROJECTS**  
 NIKIFOROV D., GALIMOV A., KOSTROMIN S., KHODZHIBAGIYAN H., EMELIANOV N.  
*Joint institute for Nuclear Research, Russia*

- 371 EFFECTS ON THE COOLING PERFORMANCE OF THE GAS DISTRIBUTION IN THE TWO-STAGE THERMAL-COUPLED PULSE TUBE CRYOCOOLER**  
 ZHANG L.(\*,\*\*), DANG H.(\*), TAN J.(\*,\*\*), ZHAO Y.(\*,\*\*), GAO Z.(\*,\*\*), BAO D.(\*,\*\*)  
 (\*), *National Laboratory for Infrared Physics, Shanghai Institute of Technical Physics, Chinese Academy of Sciences, China, (\*\*), University of Chinese Academy of Sciences, China*
- 417 THEORETICAL STUDIES ON THE REGENERATOR OF A SINGLE-STAGE STIRLING-TYPE PULSE TUBE CRYOCOOLER WORKING AT 20–35 K**  
 BAO D.(\*,\*\*), DANG H.(\*), ZHAO Y.(\*,\*\*), GAO Z.(\*,\*\*)  
 (\*), *National Laboratory for Infrared Physics, Shanghai Institute of Technical Physics, Chinese Academy of Sciences, China, (\*\*), University of Chinese Academy of Science, China*

**B1-Th-P**

- 39 EXPERIMENTAL INVESTIGATION INTO POOL BOILING HEAT TRANSFER PERFORMANCE OF TiO<sub>2</sub>-R141B NANOFUID FOR A HORIZONTAL LOW-FINUED U-TUBE**  
 CHEN R.-H., CHANG T.-B.  
*Department of Mechanical and Energy Engineering, National Chiayi University, Taiwan*
- 65 EFFECTS OF PVE OIL ON THE POOL NUCLEATE BOILING HEAT TRANSFER COEFFICIENT OF R410A**  
 TAKAISHI Y., SATO T.  
*Kanagawa Institute of Technology, Japan*
- 281 THEORETICAL AND EXPERIMENTAL STUDY ON PRESSURE DROP IN TWO-PHASE FLOW OF AMMONIA IN A FORCED EVAPORATIVE CONDENSER**  
 FILIP A., ILIE A., BALTAREȚU F., DRUGHEAN L., DAMIAN R.-M.  
*Technical University for Civil Engineering, Romania*
- 293 PERFORMANCE ANALYSIS AND CYCLE TIME OPTIMIZATION OF A SINGLE EVAPORATOR THREE-BED SOLID-SORPTION REFRIGERATION SYSTEM DRIVEN BY LOW-TEMPERATURE HEAT SOURCE**  
 ZAJACZKOWSKI B.  
*Wroclaw University of Technology, Faculty of Mechanical and Power Engineering Wyb., Poland*
- 317 PROMISING RATIONAL ENHANCEMENT OF HEAT EXCHANGE BY SECTION OF LONG SMOOTH DUCTS OF PLATE-FIN SURFACES WITH PURPOSES OF CREATION OF HIGHLY EFFECTIVE COMPACT HEAT EXCHANGERS**  
 VASILEV V., ZHATKIN A.  
*Astrakhan State Technical University, Russia*
- 349 DEVELOPMENT OF HUMIDITY MEASURING DEVICE USING POROUS CERAMIC BASED ON PRINCIPLE OF PSYCHROMETER**  
 MIURA K.(\*), IYOTA H.(\*), MATSUMOTO T.(\*), TSUJIOKA T.(\*), MORIKAWA A.(\*), TANAKA M.(\*\*), UESUGI N.(\*\*)  
 (\*), *Osaka City University, Japan, (\*\*), Miyagawa Kasei Industry Co., Ltd., Japan*



- 387 NUMERICAL ANALYSIS ON THE PERFORMANCE OF A MAGNETIC REFRIGERATOR WITH MULTIPLE MATERIALS**  
ARITA S.(\*), OKAMURA T.(\*), NOGUCHI Y.(\*), HIRANO N.(\*\*),  
BAE S.(\*\*\*)  
(\* Tokyo Institute of Technology, Japan, (\*\* Chubu Electric Power Co., Inc., Japan, (\*\*\*) Sanden Corporation, Japan
- 627 SPEED OF SOUND MEASUREMENTS OF HFO-1234ze(E) IN THE LIQUID PHASE**  
GAO L., ASOU H., HONDA T.  
Fukuoka University, Japan
- 657 PREPARATION AND THERMOPHYSICAL PROPERTIES OF MWCNTS/ PARAFFIN COMPOSITE PHASE CHANGE MATERIAL**  
WU W.(\*), ZHANG C.(\*\*), TANG H.(\*), ZHANG H.(\*)  
(\* School of Power and Power Engineering, University of Shanghai for Science and Technology, China, (\*\* Jiexiu Zhiye Zhongxue, China
- 697 EFFECTS OF BOILING HYSTERESIS ON METASTABLE TWO-PHASE FLOW OF REFRIGERANT IN A STRAIGHT ADIABATIC CAPILLARY TUBE**  
GAO L.(\*), EGUCHI H.(\*\*), TATARA Y.(\*\*), TAKAKUSHI S.(\*\*),  
HONDA T.(\*)  
(\* Fukuoka University, Japan, (\*\* Graduate School of Engineering, Fukuoka University, Japan
- 809 COMPARATIVE STUDY ON THE PERFORMANCE OF CASCADE SUPERCRITICAL CARBON DIOXIDE POWER CYCLES FOR WASTE HEAT RECOVERY**  
LEE J. S., KIM M. S.  
Department of Mechanical Engineering, Seoul National University, South Korea
- 905 INVESTIGATION OF RUNBACK ICE PHENOMENON DURING ELECTROTHERMAL DEICING PROCESS AND THE CORRESPONDING SCHEME FOR SYSTEM OPTIMIZATION**  
LIANG D., SHINAN C., BO Y.  
School of Aeronautic Science and Engineering, Beihang University, China

## B2-Th-P

- 513 A NEW FORMATION KINETICS STUDY METHOD OF TBPB AND CO<sub>2</sub> HYDRATES BASED ON DTA**  
CLAIN P.(\*), OSSWALD V.(\*\*), SPIGA O.(\*\*), DELAHAYE A.(\*\*),  
FOURNAISON L.(\*\*)  
(\* Leonard de Vinci Pôle Universitaire, Technology Lab, France, (\*\* Irstea GPAN, France
- 543 NEW CORRELATIONS OF SOME THERMOPHYSICAL PROPERTIES OF ALKALI NITRATE/NITRITE AQUEOUS SOLUTIONS FOR ABSORPTION HEAT PUMPS AND REFRIGERATION SYSTEMS ACTIVATED AT HIGH TEMPERATURE**  
VARGAS P.(\*), FITO J.(\*\*), SALAVERA D.(\*\*), CORONAS A.(\*\*)  
(\* Department of Chemical Engineering, Universidad de Antofagasta, Chile, (\*\* CREVER-Group of Applied Thermal Engineering, Universitat Rovira i Virgili, Spain

- 585 COMPARATIVE ANALYSIS OF THE PERFORMANCE OF AN OFFSET-STRIP FIN HEAT EXCHANGER AS EVAPORATOR IN A REFRIGERATION SYSTEM WITH R22 AND R417A**  
DIZ R., FERNÁNDEZ-SEARA J., PARDIÑAS Á. Á.  
Área de Máquinas y Motores Térmicos, Universidad de Vigo, Spain
- 907 EXPERIMENTAL INVESTIGATION ON REFRIGERANT FLOW DISTRIBUTION OF MICROCHANNEL EVAPORATOR**  
LIU X., WANG F., WU Q.  
ZheJiang DunAn Artificial Environment Co., LTD, China

## C1-Th-P

- 121 MODELING THE PROCESSES OF PNEUMATIC CRYOELECTROSEPARATION OF A DISPERSED RAW MATERIAL OF BIOLOGICAL ORIGIN**  
SEMENOV E.(\*), BABAKIN B.(\*), BELOZEROV G.(\*\*), VYGODIN V.(\*\*\*),  
VORONIN M.(\*), BABAKIN S.(\*)  
(\* Moscow State University of Food Production, Russia, (\*\* FGBNU Russian Scientific Research Institute for Refrigeration Industry (VNIKHI), Russia, (\*\*\*) OAO "Rosmyasomoltorg", Russia
- 277 CRYOPROTECTIVE EFFECT OF CARBOXYLATED POLY-L-LYSINE ON THE NEMATODE CAENORHABDITIS ELEGANS**  
HAYASHI M.(\*), MURASE N.(\*), MATSUMURA K.(\*\*)  
(\* School of Science and Engineering, Tokyo Denki University, Japan, (\*\* School of Materials Science, Japan Advanced Institute of Science and Technology, Japan
- 437 EFFECT OF GAP-JUNCTIONAL CELL-TO-CELL COMMUNICATION ON INTRACELLULAR ICE PROPAGATION AND CONSEQUENT CELL VIABILITY**  
FUKUNAGA T.(\*), KUBO H.(\*\*), KURATA K.(\*), HIRAHARA H.(\*\*),  
WANG H.-D.(\*), TAKAMATSU H.(\*)  
(\* Department of Mechanical Engineering, Kyushu University, Japan, (\*\* Graduate School of Engineering, Kyushu University, Japan
- 473 MITOCHONDRIAL REACTIVE OXYGEN SPECIES INVOLVED IN COLD STRESS IN HCAT CELLS**  
YAZAWA T., SEKINE H., MURASE N., NAGAHARA Y.  
College of Science and Engineering, Tokyo Denki University, Japan
- 491 DESIGN OF CLOSED-LOOP MIXED REFRIGERANT JOULE-THOMSON CRYOSURGICAL PROBE WITH PRECOOLING STAGE**  
LEE C., YOO J., PARK I., JEONG S.  
Cryogenic Engineering Laboratory, KAIST, South Korea
- 503 ESTIMATION OF DMSO CONCENTRATION FOR CELL CRYOPRESERVATION ON ADHESION STATE**  
SEKINE H., OTAKI M., HAYASHI M., MURASE N., NAGAHARA Y.  
College of Science and Engineering, Tokyo Denki University, Japan

## C2-Th-P

- 589 SURVIVAL OF SACCHAROMYCES CEREVISIAE IN REFRIGERATED FRESH ORANGE JUICE TREATED WITH CINNAMON LEAF ESSENTIAL OIL AND THERMO-SONICATION**  
SÁNCHEZ-RUBIO M. (\*), TABOADA-RODRÍGUEZ A. (\*\*), CAVA-RODA R. (\*\*), GUERROUJ K. (\*\*\*), MARÍN-INIESTA F. (\*)  
(\* Group of Food Biotechnology, Food Technology, Nutrition and Bromatology Department, Faculty of Veterinary, University of Murcia, Spain, (\*\* Debiotec (Desarrollos Bio-Tecno Alimentarios), Spain, (\*\*\*) Laboratoire de Biologie des Plantes et des Microorganismes, Faculté des Sciences, Université Mohamed Premier, Morocco
- 593 MODIFIED ATMOSPHERE PACKAGING TO EXTEND SHELF LIFE OF READY TO EAT FRESH CUT TOMATOES**  
TABOADA-RODRIGUEZ A. (\*), SANCHEZ-RUBIO M. (\*\*), CAVA-RODA R. (\*), MARÍN-INIESTA F. (\*\*)  
(\* Desarrollos Bio-Tecno-Alimentarios Ltd., Spain, (\*\* Group of Food Biotechnology, Food Technology, Nutrition and Bromatology Department, Faculty of Veterinary, University of Murcia, Campus Espinardo, Spain
- 843 THE INFLUENCE OF STORAGE PERIOD BEFORE FREEZING ON THE SENSORY QUALITY OF FISH MEAT**  
KOBAYASHI T., KOMINAMI Y., WATANABE M., SUZUKI T.  
Department of Food Science and Technology, Graduate School of Tokyo University of Marine Science and Technology, Japan

## D1-Th-P

- 427 THERMAL PROTECTION OF ICE CREAM DURING STORAGE AND TRANSPORTATION**  
LEDUCQ D., NDOYE F. T., CHARRIAU C., ALVAREZ G.  
Irstea, UR GPAN, France
- 429 ENERGY SAVINGS POTENTIAL USING THE THERMAL INERTIA OF A LOW TEMPERATURE STORAGE**  
LEDUCQ D. (\*), PIRANO M. (\*\*), ALVAREZ G. (\*)  
(\* Irstea, UR GPAN, France, (\*\* SPES scpa, Italy
- 509 NUMERICAL SIMULATIONS OF HEAT AND MASS TRANSFER IN A CHINESE CABBAGE COLD STORE**  
KOŁODZIEJCZYK M., BUTRYMOWICZ D., ŚMIERCIEW K., GAGAN J.  
Białystok University of Technology, Poland
- 519 INVESTIGATIONS OF VEGETABLES COLD STORE WITH INDIRECT COOLING SYSTEM OF THE VARIABLE CAPACITY**  
MIZERA G. (\*), BUTRYMOWICZ D. (\*\*), GAGAN J. (\*\*), ŚMIERCIERW K. (\*\*), SZCZEŚNIAK A. (\*\*\*)  
(\* Institute of Fluid-Flow Machinery of Polish Academy of Sciences, Poland, (\*\* Białystok University of Technology, Poland, (\*\*\*) REMSTAT, Poland
- 873 REFRIGERATED DISPLAY CASE DEFROSTING USING INFERENTIAL ICE SENSING**  
NUTARO J. (\*), FUGATE D. (\*), KURUGANTI T. (\*), FRICKE B. (\*), WALLACE J. (\*\*)  
(\* Oak Ridge National Laboratory, United States, (\*\* Emerson Climate Technologies, United States

- 879 DUCTLESS AIR-CONDITIONING SYSTEM USING A COANDA EFFECT AND A HORIZONTAL PANEL FOR HERB MEDICINE STORAGE IN YUBARI PROJECT**  
YOKOI M., SHIBUYA D.  
Taisei Corporation, Japan
- 883 INFLUENCE OF GRAVITY LEVEL ON THE SELF-PRESSURIZATION PERFORMANCE OF LARGE SCALE CRYOGENIC STORAGE TANK**  
LIU Z. (\*), LI Y. (\*, \*\*)  
(\* Xi'an Jiaotong University, China, (\*\* State Key Laboratory of Technologies in Space Cryogenic Propellants, China

## D2-Th-P

- 41 ATP-APPROVED EQUIPMENT FOR REFRIGERATED ROAD TRANSPORT – SERBIA'S EXPERIENCES**  
STAMENKOVIĆ D., POPOVIĆ V., VOROTOVIĆ G.  
University of Belgrade, Faculty of Mechanical Engineering, CIAH Laboratory, Serbia
- 85 ACTIVE COOLING AND THERMAL MANAGEMENT OF A DOWNHOLE TOOL ELECTRONICS SECTION**  
SOPRANI S., ENGELBRECHT K., NØRGAARD A. J.  
Department of Energy Conversion and Storage, Technical University of Denmark, Denmark

## E1-Th-P

- 175 APPLICATION INVESTIGATION ON A PUMPED LOOP HEAT PIPE HEAT EXCHANGER UNIT FOR SMALL DATA CENTER**  
WEI C., MA G., ZHOU F., XU S., ZHANG S.  
Beijing University of Technology, China
- 183 OPTIMAL DESIGN OF HEAT EXCHANGERS OF THE HEAT PIPE COMBINED EVAPORATIVE COOLING ROOM AIR CONDITIONER**  
ZHANG Y. (\*), HAN Z. (\*), LIU Q. (\*), QU L. (\*), HAN Y. (\*\*), LIN J. (\*\*\*)  
(\* School of Materials & Metallurgy, Northeastern University, China, (\*\* Xinjiang Solar Technology Development Company, China, (\*\*\*) The 70 Middle School in Urumqi, China
- 185 STUDY ON THE COMPUTER ROOM AIR CONDITIONER WITH SEPARATE TYPE HEAT PIPE AND EVAPORATIVE COOLING**  
ZHANG Y. (\*), HAN Z. (\*), MENG X. (\*), LIU Q. (\*), LI W. (\*), HAN Y. (\*\*), ZHANG Y. (\*\*)  
(\* School of Materials & Metallurgy, Northeastern University, China, (\*\* Xinjiang Solar Technology Development Company, China
- 357 A EVALUATION OF THERMAL ENVIRONMENT ON NON-UNIFORM RADIANT FIELDS**  
SAITO N. (\*), SAKAI K. (\*), ONO H. (\*\*)  
(\* Meiji University, Japan, (\*\* Central Research Institute of Electric Power Industry, Japan
- 455 NOVEL ABSORPTION REFRIGERATION SYSTEM WITH A HOLLOW FIBER MEMBRANE-TYPE GENERATOR**  
HONG S. J., DANG C., OKAMOTO H., WANG Z., HIHARA E.  
Institute of Environmental Studies, Graduate School of Frontier Sciences, The University of Tokyo, Japan
- 461 ENERGY SAVING PERFORMANCE OF THE WET-AIR-CONDITIONING SYSTEM**  
TATEIWA K., MURASAWA I., WATANABE T.  
TONETS Corporation, Japan

**613 INFLUENCE OF REFRIGERANT CHARGE AND AIR INLET TEMPERATURES ON THE PERFORMANCE OF AN AUTOMOTIVE AIR CONDITIONING SYSTEM**

MACAGNAN M. H., COPETTI J. B.  
*LETEF, Universidade do Vale do Rio dos Sinos, Brazil*

**801 INLET-AIR COOLING SYSTEM WITH CENTRIFUGAL-CHILLER MODULE**

SAKAI M.(\*), TSUJI K.(\*), HIDAKA K.(\*\*), KOGA J.(\*\*\*)  
*(\*) Mitsubishi Heavy Industries, LTD, Chiller & Heat Pump Engineering Department Air-Conditioning & Refrigeration Division Machinery, Equipment & Infrastructure, Japan, (\*\*) Mitsubishi Hitachi Power Systems, LTD, Power Systems Service Headquarters, Japan, (\*\*\*) Mitsubishi Heavy Industries, LTD, Takasago Research & Development Center Technology & Innovation Headquarters, Japan*

**811 NUMERICAL INVESTIGATION OF FLOW AND HEAT TRANSFER FOR A SPLIT AIR CONDITIONER INDOOR UNIT**

LAI X., LIU N., YAN K. ZHANG H.  
*College of Energy and Power Engineering, University of Shanghai for Science and Technology, China*

**889 PERFORMANCE EVALUATION OF FAN COIL UNITS WITH INCREASED CHILLED WATER SUPPLY TEMPERATURES**

CHIANG H.-C., WU J.-R., CHUNG J.-C., LIAW J.-S., JENG M.-S.  
*Green Energy and Environment Research Laboratories, Industrial Technology, Taiwan*

**897 ENERGY SAVING ANALYSIS OF THE CENTRAL AIR-CONDITIONING CHILLER SYSTEM FOR A SHOPPING CENTER**

KUAN Y.-D.(\*), LIN H.-C.(\*), CHANG J.-Y.(\*\*), CIUO Y.-W.(\*)  
*(\*) Department of Refrigeration, Air-Conditioning and Energy Engineering, National Chin-Yi University of Technology, Taiwan, (\*\*) Department of Marine Engineering, Taipei College of Maritime Technology, Taiwan*

**E2-Th-P**

**43 EXPERIMENTAL BENCH DESIGN FOR HEAT PUMP USING CO<sub>2</sub> BASED MIXTURES DEVELOPEMENT D'UN BANC EXPERIMENTAL POUR POMPE A CHALEUR UTILISANT DES MELANGES A BASE DE CO<sub>2</sub>**

BOUTEILLER P., TOBALY P., TERRIER M.-F., TOUBLANC C.  
*CNAM Laboratory CMGPCE, France*

**243 OPTIMAL TEMPERATURE DIFFERENCES IN THE EVAPORATOR AND CONDENSER OF A REFRIGERATION OR ORGANIC RANKINE CYCLE SYSTEM BASED ON EXERGOCHEMICAL ANALYSIS**

ALEXANDRU A.(\*), APOSTOL V.(\*), PRISECARU M.(\*), DOBRE C.(\*), DOBROVICESCU A.(\*), NASTASE G.(\*\*)  
*(\*) University Politehnica of Bucharest, Faculty of Mechanical Engineering and Mechatronics, Department of Thermodynamics, Romania, (\*\*) Transylvania University of Brasov, Romania*

**279 CONSIDERATIONS FOR THE USE OF HEAT PUMPS WITH COMBINED THERMAL STORAGE AS A DSM TOOL IN A DOMESTIC RETROFIT SETTING**

WILSON C., SHAH N., HEWITT N., HAUNG M.  
*Ulster University, United Kingdom*

**285 USING PSO-SMITH CASCADE CONTROL ALGORITHM FOR WATER SOURCE HEAT PUMP SYSTEMS**

TSAI K.-I.  
*Department of Refrigeration, Air-Conditioning and Energy, National Chin-Yi University of Technology, Taiwan*

**309 COMPARATIVE ANALYSIS OF R134a, R744 AND R22 USED IN A HYBRID HEAT SOURCE HEAT PUMP WATER HEATER**

LI S., LI S., ZHANG X.  
*School of Energy and Environment, Southeast University, China*

**451 OPTIMIZATION OF THERMAL PERFORMANCE IN HEAT PUMP'S BOREHOLE HEAT EXCHANGER**

BIALKO B., SANDLER S., KROLICKI Z., ZAJACZKOWSKI B.  
*Wroclaw University of Technology, Poland*

**453 DIESEL COMBUSTION OF OIL AND REFRIGERANT MIXTURE DURING PUMP-DOWN OF AIR CONDITIONERS**

HIGASHI T.(\*), SAITOH S.(\*\*), DANG C. B.(\*), HIHARA E.(\*)  
*(\*) Department of Human and Engineered Environmental Studies, Graduate School of Frontier Sciences, The University of Tokyo, Japan, (\*\*) Department of Mechanical Engineering, The University of Tokyo, Japan*

**595 EMPIRICAL PLATFORM DATA ANALYSIS TO INVESTIGATE HOW HEAT PUMPS OPERATE IN REAL-LIFE CONDITIONS**

CARMO C.(\*), ELMEGAARD B.(\*\*), NIELSEN M. P.(\*), DETLEFSEN N.(\*\*\*)  
*(\*) Aalborg University - Department of Energy Technology, Denmark, (\*\*) DTU - Department of Mechanical Engineering, Thermal Energy, Denmark, (\*\*\*) Insero Energy, Denmark*

**713 ASSESSMENT OF A TWO-STAGE COMPRESSION HEAT PUMP CYCLE USING MIXTURE R290/R744 FOR WATER HEATER APPLICATIONS**

XING M., YU J.  
*Department of Refrigeration & Cryogenic Engineering, School of Energy and Power Engineering, Xi'an Jiaotong University, China*

**757 MEASUREMENT OF WATER VAPOUR DIFFUSION COEFFICIENT IN THE PACKED BED OF ZEOLITE PARTICLES FOR THE ADSORPTION HEAT PUMP**

HIROTA Y., MIZUTANI Y., YAMAUCHI T., SHIMAZU T.  
*Toyota Central R&D Labs., Inc., Japan*

**807 DEVELOPMENT OF A HEAT PUMP SYSTEM FOR HIGH-TEMPERATURE HEAT SUPPLY WITH HEAT RECOVERY USING METHANOL AS THE REFRIGERANT**

SHIKICHI K.(\*), ASANO H.(\*\*)  
*(\*) The Kansai Electric Power Co., Inc., Japan, (\*\*) Department of Mechanical Engineering, Kobe University, Japan*

**S1-Th-P**

**21 EXPERIMENTAL INVESTIGATIONS ON THE THERMAL PERFORMANCE OF THE VENTILATED BIPV WALL**

YU C.-W.(\*), HOU S.-P.(\*\*), TZENG C.-T.(\*), LAI C.-M.(\*\*)  
*(\*) Department of Architecture, National Cheng-Kung University, Taiwan, (\*\*) Department of Civil Engineering, National Cheng-Kung University, Taiwan*

- 255 CONCEPT AND CALCULATION METHOD OF LOCAL COOLING/ HEATING LOAD APPLIED TO NON-UNIFORM INDOOR ENVIRONMENT**  
 LIANG C.(\*,\*\*), SHAO X.(\*), LI X.(\*,\*\*)  
 (\*) Department of Building Science, School of Architecture, Tsinghua University, China, (\*\*) Key Laboratory of Eco Planning & Green Building, Ministry of Education, Tsinghua University, China
- 311 EVALUATION AND OPTIMIZATION OF THERMAL PERFORMANCE AND AIR DISTRIBUTION IN RAISED-FLOOR DATA CENTER**  
 LING Y.-Z., ZHANG X.-S.  
 School of Energy and Environment, Southeast University, China
- 659 A MEASUREMENT OF VELOCITY FIELDS IN A FLOOR HEATING ROOM FOR VALIDATION OF CFD**  
 OKAZAKI S.(\*), SAKAI K.(\*), ONO H.(\*\*), KAJIYA R.(\*)  
 (\*) Meiji University, Japan, (\*\*) Central Research Institute of Electric Power Industry, Japan
- 701 STUDY ON ENERGY SAVING SIMULATION FOR A FOOTBALL STADIUM**  
 AWAJI K., NEMOTO K., IMADA S., ONODA H., NAGATA K.  
 Waseda University, Japan
- 707 PERFORMANCE ANALYSIS AND CAPACITY SIZING FOR CHILLERS FOR THE HVAC SYSTEM IN A HOTEL BUILDING**  
 WANG F.-J.(\*), LIN H.-W.(\*\*), TU W.-D.(\*\*), WANG Y.-Y.(\*)  
 (\*) Department of Refrigeration, Air Conditioning and Energy Engineering, National Chin-Yi University of Technology, Taiwan, (\*\*) Green Energy and Environment Research Laboratories, Industrial Technology Research Institute, Taiwan

**THURSDAY, AUGUST 20**

**13:30-15:10**

**BOILING(2)**

**B1-Th-3a Room 301**

Chairs: CHIEN L. (National Taipei University of Technology, Taiwan)  
 KARIYA K. (Saga University, Japan)

- 13:30 282 HEAT TRANSFER CHARACTERISTICS OF R32, R410A AND R1234YF DURING EVAPORATION INSIDE HORIZONTAL MINICHANNEL**  
 CHIEN N. B.(\*), VU P. Q.(\*), CHOI K.-I.(\*\*), OH J.-T.(\*\*)  
 (\*) Graduate School, Chonnam National University, South Korea, (\*\*) Department of Refrigeration and Air Conditioning Engineering, Chonnam National University, South Korea
- 13:50 549 R1234ze(E) FLOW BOILING HEAT TRANSFER AND PRESSURE DROP INSIDE A 2.4 mm MICROFIN TUBE**  
 DIANI A.(\*), MANCIN S.(\*\*), CAVALLINI A.(\*), ROSSETTO L.(\*)  
 (\*) Dipartimento di Ingegneria Industriale, Università degli Studi di Padova, Italy, (\*\*) Dipartimento di Tecnica e Gestione dei Sistemi Industriali, Università degli Studi di Padova, Italy

- 14:10 628 EXPERIMENTAL INVESTIGATION ON FLOW BOILING PRESSURE DROP OF R600a IN MULTI-PORT MINICHANNEL TUBE**  
 COPETTI J. B., MACCAGNAN M. H., DE SÁ BECKERLE B.  
 Mechanical Engineering Graduate Program, Universidade do Vale do Rio dos Sinos – UNISINOS, Brazil
- 14:30 703 EFFECT OF CHANNEL GEOMETRY ON BOILING HEAT TRANSFER AND PRESSURE DROP OF R32 INSIDE HORIZONTAL MULTI-PORT TUBES**  
 JIGE D.(\*), TERASHIMA Y.(\*\*), INOUE N.(\*), KOYAMA S.(\*\*\*)  
 (\*) Tokyo University of Marine Science and Technology, Japan, (\*\*) School of Marine Electronics and Mechanical Engineering, Tokyo University of Marine Science and Technology, Japan, (\*\*\*) Kyushu University, Japan
- 14:50 564 FLOW BOILING HEAT TRANSFER OF R1234yf ON A MICROPARTICLE COATED COPPER SURFACE**  
 MANCIN S.(\*), DIANI D.(\*\*), VEZZÙ S.(\*\*\*), ROSSETTO L.(\*\*)  
 (\*) Department of Management and Engineering, University of Padova, Italy, (\*\*) Department of Industrial Engineering, University of Padova, Italy, (\*\*\*) Veneto Nanotech, Italy

**MAGNETOCALORIC REFRIGERATION(1)**

**B1-Th-3b Room 303**

Chairs: KAWANAMI T. (Kobe University, Japan)  
 ENGELBRECHT K. (Technical University of Denmark, Denmark)

- 13:30 347 MAGNETOCALORIC EFFECT IN Nd<sub>0.7</sub>Sr<sub>0.3</sub>MnO<sub>3</sub>:CuO COMPOSITES**  
 EL MAALAM K.(\*,\*\*), MOUBARIK Y.(\*,\*\*), ALI M. B.(\*,\*\*), MOUNKACHI O.(\*), MOUSSAOUI H. E.(\*), HAMEDOUN M.(\*), HLIL E.-K.(\*\*\*), BENYOUSSEF A.(\*,\*\*,\*\*\*)  
 (\*) Materials-Nanomaterials Center, MAScIR Foundation, Morocco, (\*\*) LMPHE Laboratory, Faculty of science-Mohammed V University, Morocco, (\*\*\*) Hassan II Academy of Science and Technology, Morocco, (\*\*\*\*) Institut Néel CNRS-UJF, France
- 13:50 890 INTERFEROMETRIC MEASUREMENT OF THE HEAT TRANSFER ENHANCEMENT DRIVEN BY A MAGNETOHYDRODYNAMIC FLOW AT A MAGNETIZED GADOLINIUM PLATE**  
 LEI Z., ECKERT K.  
 Institute of Fluid Mechanics, Technische Universität Dresden, D-01069 Dresden, Germany
- 14:10 202 A SECOND-ORDER MAGNETOCALORIC MODEL SUBSTANCE FOR STANDARDIZATION PURPOSES**  
 VUARNOZ D. (\*), EGOLF P. W.(\*), GAMA S. (\*\*), COELHO A. A. (\*\*\*)  
 (\*)University of Applied Sciences of Western Switzerland Institute of Thermal Sciences and Engineering, Switzerland, (\*\*)Universidade Federal de São Paulo UNIFESP – Campus DIADEMA, Brazil, (\*\*\*)Universidade Estadual de Campinas, Brazil
- 14:30 383 EXPERIMENTAL STUDY OF ROOM TEMPERATURE MAGNETIC REFRIGERATOR USING MULTILAYERED MAGNETOCALORIC MATERIALS**  
 MIYAZAKI Y., IKEDA K.(\*), WAKI K.(\*), HIRANO N.(\*\*), BAE S.(\*\*\*), OKAMURA T.(\*\*\*\*), KAWANAMI T.(\*\*\*\*\*)  
 (\*) Railway Technical Research Institute, Japan, (\*\*) Chubu Electric Power Co., Inc., Electric Power R&D Center, Japan, (\*\*\*) Sanden Corporation, Department of Research and Development, R&D Division, Japan, (\*\*\*\*) Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology, Japan, (\*\*\*\*\*) Kobe University, Japan

## ENERGY MANAGEMENT

### S1-Th-3 Room 313+314

Chairs: YAN W. (National Taipei University of Technology, Taiwan)  
SAKAI K. (Meiji University, Japan)

- 13:30 222 DEVELOPMENT OF AN INTEGRATED ENERGY SIMULATION TOOL FOR BUILDINGS AND MEP SYSTEMS, THE BEST SIMULATION STUDY OF COGENERATION SYSTEM IN HOTELS USING BEST PROGRAM 2013**  
SATO H. (\*), TSUJIMARU N. (\*), MURAKAMI S. (\*\*), AKIMOTO T. (\*\*\*)  
ISHINO H. (\*\*\*\*), SASAJIMA K. (\*\*\*\*\*), NOHARA F. (\*\*\*\*\*),  
NINOMIYA H. (\*\*\*\*\*), FUJII T. (\*\*\*\*\*), KUZUKI R. (\*\*\*\*\*),  
YUASA R. (\*\*\*\*\*)  
(\*) Satoh Energy Research Co., Ltd., Japan, (\*\*) Institute for Building Environment and Energy Conservation, Japan, (\*\*\*) Shibaura Institute of Technology, Japan, (\*\*\*\*) Tokyo Metropolitan University, Japan, (\*\*\*\*\*) Nihon Sekkei Co., Ltd., Japan, (\*\*\*\*\*) Nikken Sekkei Co., Ltd., Japan, (\*\*\*\*\*\*) Hitachi, Ltd., Japan, (\*\*\*\*\*\*) Tokyo Gas Co., Ltd., Japan
- 13:50 445 DOCUMENTATION OF AN INTEGRATED THERMAL ENERGY SYSTEM FOR A BUILDING COMPLEX**  
ROHDE D. (\*), BANTLE M. (\*\*), ANDRESEN T. (\*\*), NORD N. (\*)  
(\* Norwegian University of Science and Technology, Norway, (\*\* SINTEF Energy Research, Norway)
- 14:10 Withdrawn**
- 14:30 5 TRANSIENT THERMAL ENERGY STORAGE IN A PARTITIONED ENCLOSURE PACKED WITH MEPCM**  
SIAO Y.-H. (\*), YAN W.-M. (\*\*), LAI C.-M. (\*\*\*)  
(\* Department of Mechanical Engineering, National Cheng-Kung University, Taiwan, (\*\*) Department of Energy and Refrigerating Air-Conditioning Engineering, Taiwan, (\*\*\*) Department of Civil Engineering, National Cheng-Kung University, Taiwan
- 14:50 146 PERFORMANCE OF UNDERFLOOR HEATING SYSTEM WITH PHASE CHANGE COVERING MATERIALS**  
HUANG M. J., HEWITT N. J.  
Centre for Sustainable Technologies, School of Built Environment, Ulster University, United Kingdom

## A/C LARGE SPACE

### E1-Th-3 Room 411+412

Chairs: NAGAI T. (Tokyo University of Science, Japan)  
SATO H. (Satoh Energy Research Co., Ltd, Japan)

- 13:30 54 AIR DISTRIBUTION IMPROVEMENT OF CLOSED TYPE SERVER CABINETS USING FLOW BAFFLES**  
CHEN H. Y., CHUAH Y. K., HSIEH M. H., CHANG S. H.  
National Taipei University of Technology, Taiwan
- 13:50 160 AN INTEGRATED CHILLER USING MAGNETIC-BEARING COMPRESSOR WITH THERMOSYPHON FOR YEAR-ROUND COOLING OF INTERNET DATA CENTRES: FEASIBILITY ANALYSIS**  
ZHANG P., SHI W., WANG B., SHANG S., LI X.  
Department of Building Science, Tsinghua University, China

- 14:10 181 EVALUATION METHOD OF OPERATION PERFORMANCE OF HVAC SYSTEM BASED ON CONCORDANCE RATIO ANALYSIS**  
WANG Y., JIN X., FANG X., DU Z.  
School of Mechanical Engineering, Shanghai Jiao Tong University, China
- 14:30 274 ENERGY-SAVING PERFORMANCE OF COMMERCIAL AIR-CONDITIONER WITH SPRAYING APPARATUS ATTACHED TO THE OUTDOOR UNIT**  
MIYAOKA Y. (\*), NAGAMATSU K. (\*), NAMIWO T. (\*), HIROTA M. (\*\*)  
(\* Chubu Electric Power Co., Inc., Japan, (\*\*) Mie University, Department of Mechanical Engineering, Japan
- 14:50 936 IMPROVING BUILT ENVIRONMENTAL DESIGN IN LARGE-SPACE BUILDING BY NUMERICAL ANALYSIS METHOD AND STATE SPACE METHOD: A CASE STUDY**  
LIANG N., MA X., XU H.  
Beijing Engineering Research Center of Digital Architectural Design and Construction, Beijing Institute of Architectural Design, China

## EVAPORATOR(3)

### B2-Th-3a Room 413

Chairs: INOUE N. (Tokyo University of Marine Science and Technology, Japan)  
DE PAEPE M. (Ghent University, Belgium)

- 13:30 885 NUMERICAL PERFORMANCE OF A NOVEL AIR SIDE FIN USED IN HEAVEY DUTY ENGINE**  
QI Z.  
Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University, China
- 13:50 937 EVAPORATION HEAT TRANSFER OF WATER IN PLATE HEAT EXCHANGERS WITH OPERATION PARAMETERS AT HIGH TEMPERATURE CONDITIONS**  
KIM S. W. (\*), BAEK C. (\*\*), LEE J. S. (\*), KIM Y. (\*\*)  
(\* Graduate School of Mechanical Engineering, Korea University, South Korea, (\*\*) Department of Mechanical Engineering, Korea University, South Korea

## ICE SLURRY(1)

### B2-Th-3b Room 414+415

Chairs: SUZUKI H. (Kobe University, Japan)  
TBD

- 13:30 492 PARTICLE SIZE DISTRIBUTION IN ICE SLURRY SYSTEMS - SETUP AND ANALYSIS**  
KOFFLER M., SCHAAF J., KAUFFELD M.  
University of Applied Sciences Karlsruhe - Institute of Refrigeration, Air-Conditioning, and Environmental Engineering (IKKU), Germany
- 13:50 558 A STUDY OF ICE-SLURRY PRODUCTION PROCESS IN SCRAPED-SURFACE TYPE GENERATOR**  
KOLESNIKOV A., BUZUKASHVILI I., KROTOV A., KLYACHKO L.,  
UMANSKIY V., MAKAROV B.  
Central Scientific-Research Institute "Kurs" (CSRI "Kurs"), Russia
- 14:10 651 STUDY ON GENERATOR FOR ICE SLURRY USING THE PRESSURE SHIFT FREEZING METHOD**  
FUMOTO K. (\*), KAWANAMI T. (\*\*), INAMURA T. (\*)  
(\* Hirosaki University, Japan, (\*\*) Kobe University, Japan

**14:30 869 ICE SLURRY PRODUCTION IN A TUBULAR HEAT EXCHANGER**

LE BAIL A., HAVET M.  
LUNAM University, ONIRIS, UMR 6144 GEPEA, CNRS, France

**14:50 893 ICE SLURRY PROPERTIES OF SEAWATER**

MELINDER Å., IGNATOWICZ M.  
Department of Energy Technology, Royal Institute of Technology, Sweden

**RESIDENTIAL AND COMMERCIAL HEAT-PUMP SYSTEMS(4)**

**E2-Th-3 Room 416+417**

Chairs: OHNO K. (Waseda University, Japan)  
ENOKI K. (The University of Electro-Communications, Japan)

**13:30 817 NUMERICAL STUDY FOR DETECTION OF REFRIGERANT LEAKAGE IN VAPOR COMPRESSION REFRIGERATION CYCLE**

YOO J. W., HONG S. B., KIM M. S.  
Department of Mechanical Engineering, Seoul National University, South Korea

**13:50 853 FIELD MEASUREMENTS OF GROUND SOURCE HEAT PUMP SYSTEMS INSTALLED IN EXISTING SINGLE FAMILY HOUSES – EVALUATION AFTER SEVERAL YEARS OF OPERATION**

HAGLUND STIGNOR C., TILJANDER P., ALSBJER M.  
SP Technical Research Institute of Sweden, Sweden

**14:10 875 DEVELOPMENT OF CASCADE PID CONTROL FOR A AIR SOURCE HEAT PUMP IN COOLING MODE USING SYSTEM IDENTIFICATION EXPERIMENTAL STUDY**

HAN D.(\*), CHANG Y.(\*\*), KIM Y.(\*\*\*)  
(\* Graduate School of Mechanical Engineering, Korea University, South Korea, (\*\*) School of Mechanical System Engineering, Kookmin University, South Korea, (\*\*\*) Department of Mechanical Engineering, Korea University, South Korea

**14:30 882 INVESTIGATION ON PERFORMANCE OF AIR SOURCE HEAT PUMP WATER HEATER COMBINED WITH LIQUID-VAPOR SEPARATION CONDENSER**

ZHENG W., CHEN Y., YANG Q., ZHONG T., LUO X.  
School of Material and Energy, Guangdong University of Technology, Guangzhou Higher Education Mega Center, China

**14:50 108 SMART FAULT DETECTION AND DIAGNOSIS FOR HEAT PUMP SYSTEMS**

MADANI H.  
KTH Royal Institute of Technology, Sweden

**WORKSHOP: RISK ASSESSMENT OF MILDLY FLAMMABLE REFRIGERANTS**

**WS9-Th-3/WS9-Th-4 Room 304**

Chairs: HIHARA E. (The University of Tokyo, Japan)  
FUJIMOTO S. (The Japan Refrigeration and Air Conditioning Industry Association (JRAIA), Daikin Industries, Ltd., Japan)

**WORKSHOP: SIRACH**

**WS10-Th-3 Room 418**

Chair: MAIDMENT G. (London South Bank University(LSBU), United Kingdom)

**THURSDAY, AUGUST 20**

**15:30-17:10**

**BOILING(3)**

**B1-Th-4a Room 301**

Chairs: OH J. (Chonnam National University, South Korea)  
FUKUDA S. (Kyushu University, Japan)

**15:30 682 HEAT TRANSFER COEFFICIENT OF TWO-PHASE FLOW BOILING WITH LOW VAPOR QUALITY**

PAMITRAN A. S., KHABIBAH U., ALHAMID M. I., NASRUDDIN N.  
Department of Mechanical Engineering, University of Indonesia, Indonesia

**15:50 704 EVAPORATION HEAT TRANSFER AND PRESSURE DROP OF R245fa INSIDE A HORIZONTAL SMOOTH TUBE**

WATANABE K.(\*), JIGE D.(\*\*), INOUE N.(\*\*)  
(\* Graduate School of Marine Science and Technology, Tokyo University of Marine Science and Technology, Japan, (\*\*) Tokyo University of Marine Science and Technology, Japan

**16:10 709 EXPERIMENTAL STUDY ON SUBCOOLED FLOW BOILING CHARACTERISTICS OF R134a IN HORIZONTAL HELICALLY-COILED TUBES**

HAN J.(\*), KONG L.(\*), SHAO L.(\*), CHEN C.(\*), LU G.(\*\*)  
(\* School of Energy and Power Engineering, Shandong University, China, (\*\*) Department of Thermal Engineering, Chengde Petroleum College, China

**16:30 162 EXPERIMENTAL STUDY ON BOILING HEAT TRANSFER OF R32/R290 IN HORIZONTAL TUBES**

LIU F., HAN B., CAI D., TIAN Q., HE G.  
School of Energy and Power Engineering, Huazhong University of Science and Technology, China

**16:50 141 EXPERIMENTAL INVESTIGATION OF THE INFLUENCE OF LUBRICATING OIL ON THE FLOW BOILING HEAT TRANSFER AND PRESSURE DROP OF CO<sub>2</sub> INSIDE AN ENHANCED TUBE**

WEISE S., WETZEL M., HÖRNBERGER M., DIETRICH B., WETZEL T.  
Institute of Thermal Process Engineering, Karlsruhe Institute of Technology (KIT), Germany

**MAGNETOCALORIC REFRIGERATION(2)**

**B1-Th-4b Room 303**

Chairs: EGOLF P. W. (University of Applied Sciences of Western Switzerland, Switzerland)  
MIYAZAKI Y. (Railway Technical Research Institute, Japan)

**15:30 488 DEVELOPMENT OF A NOVEL ROTARY MAGNETIC REFRIGERATOR**

LOZANO J. A., CAPOVILLA M. S., TREVIZOLI P. V., BARBOSA J. R.  
POLO – Research Laboratories for Emerging Technologies in Cooling and Thermophysics, Department of Mechanical Engineering, Federal University of Santa Catarina, Brazil

**15:50 812 EXPERIMENTAL STUDIES WITH AN ACTIVE MAGNETIC REGENERATING REFRIGERATOR**

ERIKSEN D., ENGELBRECHT K., BAH L. C., BJØRK R., NIELSEN K., INSINGA A., DALLOLIO S., PRYDS N.  
DTU Energy, Technical University of Denmark, Denmark

**16:10 171 EXPERIMENTAL STUDY ON THERMAL CHARACTERISTICS OF ROTATIONAL TYPE MAGNETOCALORIC DEVICE WITH DIFFERENT MAGNETOCALORIC MATERIAL PARTICLE BED ARRANGEMENTS**  
HIRANO S.(\*), KAWANAMI T.(\*\*), TOBA A.(\*), FUMOTO K.(\*\*\*)  
(\* Hokkaido Research Organization, Japan, (\*\* Graduate School of Kobe University, Japan, (\*\*\*) Hirosaki University, Japan

**16:30 262 PERFORMANCE PREDICTION OF MAGNETOCALORIC HEAT PUMP WITH MATERIAL LAYERED ACTIVE MAGNETIC REGENERATOR**  
ASOU M.(\*), KAWANAMI T.(\*), HIRANO S.(\*\*), SHIRAI K.(\*), HIRASAWA S.(\*)  
(\* Department of Mechanical Engineering, Kobe University, Japan, (\*\* Hokkaido Research Organization, Japan

**16:50 839 ELECTROCALORIC REFRIGERATION AND HEAT PUMPING: FROM THEORY TO APPLICATIONS**  
PLAZNIK U., KITANOVSKI A., POREDOŠ A.  
University of Ljubljana, Faculty of Mechanical Engineering, Slovenia

#### MODELING / SIMULATION

##### E1-Th-4 Room 411+412

Chairs: IM P. (Oak Ridge National Laboratory, United States)  
OHNO K. (Waseda University, Japan)

**15:30 32 OPTIMIZATION OF COMPRESSOR LOAD SHARING IN MULTIPLE FIXED SPEED COMPRESSORS HEAT PUMP**  
BARELLA A., DE ANTONELLIS S., JOPPOLO C. M., MOLINAROLI L., PASINI A.  
Dipartimento di Energia - Politecnico di Milano, Italy

**15:50 235 A CONTROL-ORIENTED HYBRID MODEL FOR A DIRECT EXPANSION AIR CONDITIONING SYSTEM**  
WANG X., XU X.  
Institute of Refrigeration and Cryogenics, Zhejiang University, Key Laboratory of Refrigeration and Cryogenic Technology of Zhejiang Province, China

**16:10 266 DEVELOPMENT OF AN OBJECT-ORIENTED MODEL FOR CHILLED-WATER THERMAL ENERGY STORAGE APPLICATIONS**  
TERZIBACHIAN E.(\*,\*\*), TREMEAC B.(\*), MARVILLET C.(\*), ESPARCIEUX P.(\*\*)  
(\* Laboratoire de Chimie Moléculaire, Génie des Procédés Chimiques et Energétique (CMGPCE-EA21), CNAM, France, (\*\* Atisys Concept Sarl, France

**16:30 236 CAN AIR CURTAINS BE USED TO BUILD A NON-UNIFORM INDOOR ENVIRONMENT AND SAVE ENERGY?**  
SHEN C., SHAO X., LI X.  
Department of Building Science, School of Architecture, Tsinghua University, China

**16:50 156 THE IMPACT OF AN OSCILLATING AIR-SUPPLY GUIDE VANE ON THE THERMO-HYDRAULIC FIELD IN A SQUARE CAVITY WITH SINGLE INLET AND OUTLET PORTS**  
SHIH Y.-C., NIEN S.-W., WUN C.-H., CHENG R.-C.  
Department of Energy and Refrigerating Air-Conditioning Engineering, National Taipei University of Technology, Taiwan

#### HEAT PIPE / OTHERS(1)

##### B2-Th-4a Room 413

Chairs: HONDA T. (Fukuoka University, Japan)  
KIM Y. (Korea University, South Korea)

**15:30 205 PERFORMANCE OF AN AIR CONDITIONING SYSTEM HEAT RECOVERY UNIT WITH PULSATING HEAT PIPES HEAT EXCHANGER**  
XIE G., AN L., ZHANG L.  
Beijing University of Civil Engineering and Architecture, China

**15:50 269 NUMERICAL MODELING OF HEAT TRANSFER IN A TWO-PHASE CLOSED THERMOSYPHON**  
CAO J., LI M., LI B., HOU Y., ZHANG X.  
State Key Laboratory of Multiphase Flow in Power Engineering Xi'an Jiaotong University, China

**16:10 747 THERMOSYPHON PERFORMANCE IN TURFGRASS GREEN SEASON PROLONGATION WITH SHALLOW GEOTHERMAL SOURCE**  
ZHOU F., MA G., ZHANG X., LIU Z.  
College of Environmental and Energy Engineering, Beijing University of Technology, China

**16:30 270 EXPERIMENTAL AND THEORETICAL ANALYSIS OF A HEAT PIPE HEAT EXCHANGER USING HFC-152a AS WORKING FLUID**  
RIGHETTI G., MANCIN S., ZILIO C., LONGO G. A.  
University of Padova, Department of Management and Engineering, Italy

**16:50 365 EXPERIMENTAL STUDY ON CPU COOLING WITH THERMOELECTRIC INTERGRADED WITH HEAT PIPES**  
HU H. M., GE T. S., ZHANG B. Y., DAI Y. J., WANG R. Z.  
Institute of Refrigeration and Cryogenics, Key Laboratory for Power Machinery and Engineering of M.O.E, Shanghai Jiao Tong University, China

#### ICE SLURRY(2) / SECONDARY REFRIGERANT(1)

##### B2-Th-4b Room 414+415

Chairs: FUMOTO K. (Hirosaki University, Japan)  
LE BAIL A. (LUNAM University, Oniris, UMR 6144 GEPEA, CNRS, France)

**15:30 394 FABRICATION OF SILICA HARD-SHELL MICROCAPSULE CONTAINING INORGANIC PHASE-CHANGE MATERIALS**  
TAMARU M.(\*), SUZUKI H.(\*), HIDEAMA R.(\*\*), KOMODA Y.(\*)  
(\* Department of Chemical Science and Engineering, Kobe University, Japan, (\*\* Organization of Advanced Science and Technology, Kobe University, Japan

**15:50 467 ENERGY STUDY OF CO<sub>2</sub> HYDRATE SLURRIES FORMATION IN A TANK REACTOR**  
OIGNET J.(\*), DELAHAYE A.(\*), DUFOUR T.(\*), HOANG H. M.(\*), CLAIN P.(\*\*), FOURNAISON L.(\*)  
(\* Irstea, GPAN, France, (\*\* ESILV, France

**16:10 2 THERMODYNAMIC ASSESSMENT OF WATER-ALUMINA NANOFUIDS AS SECONDARY WORKING FLUIDS IN REFRIGERATION SYSTEMS AIMING AT THE EXTERNAL IRREVERSIBILITIES OF THE CYCLE**  
PEREIRA R.(\*,\*\*), LOYOLA F. R.(\*), DELIMA-SILVA JR. W.(\*), CARDOSO R. P.(\*\*), HERMES C. J. L.(\*)  
(\* Laboratory of Thermodynamics and Thermophysics, Federal University of Paraná, Brazil, (\*\* Laboratory of Plasma and Powder Technology, Federal University of Paraná, Brazil

- 16:30 493 INFLUENCE OF A HEAT FLUX TO ICE ADHESION FORCE**  
 SCHAAF J., KOFFLER M., KAUFFELD M.  
*University of Applied Sciences Karlsruhe - Institute of Refrigeration, Air Conditioning and Environmental Engineering, Germany*
- 16:50 258 MELTING BEHAVIOR AND HEAT TRANSFER CHARACTERISTICS OF WATER-INSOLUBLE MATERIAL IMMERSed IN WATER**  
 HIRAI R.(\*), KAWANAMI T.(\*), SOTA G.(\*), FUMOTO K.(\*\*), SHIRAI K.(\*), HIRASAWA S.(\*)  
 (\*) *Department of Mechanical Engineering, Kobe University, Japan, (\*\*)*  
*Department of Intelligent Mechanical and System Engineering, Hirosaki University, Japan*

**SORPTION SYSTEMS (ABSORPTION, ADSORPTION, DEC)(2)**  
**E2-Th-4 Room 416+417**

Chairs: VARELA R. J. (*Waseda University, Japan*)  
 ENOKI K. (*The University of Electro-Communications, Japan*)

- 15:30 90 ENHANCEMENT OF GENERATION OF HIGH-TEMPERATURE STEAM FROM A NOVEL ADSORPTION HEAT PUMP ASSISTED BY THERMAL ENERGY STORAGE MATERIAL**  
 NAKASO K.(\*), KOBAYASHI S.(\*), ESHIMA S.(\*), KAWAKAMI Y.(\*\*), TANINO M.(\*\*), FUKAI J.(\*)  
 (\*) *Kyushu University, Japan, (\*\*)* *Takasago Thermal Engineering Co., Ltd., Japan*
- 15:50 188 ADSORPTION CHARACTERISTICS OF ETHANOL ONTO PROMISING ADSORBENTS FOR ADSORPTION COOLING APPLICATIONS**  
 EL-SHARKAWY I. I.(\*,\*\*\*), MIYAZAKI T.(\*), SAHA B. B.(\*,\*\*), KOYAMA S.(\*,\*\*)  
 (\*) *Faculty of Engineering Sciences, Kyushu University, Japan, (\*\*)* *Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Japan, (\*\*\*)* *Mechanical Power Engineering Department, Faculty of Engineering, Mansoura University, Egypt, (\*)* *International Institute for Carbon-Neutral Energy Research (WPI-I2CNER), Kyushu University, Japan*
- 16:10 191 THEORETICAL COMPARISONS BETWEEN ABSORPTION HEAT PUMP AND ELECTRICAL HEAT PUMP FOR LOW TEMPERATURE HEATING**  
 WU W., SHI W., WANG B., LI X.  
*Department of Building Science, Tsinghua University, China*
- 16:30 865 IMPROVING WATER AND ENERGY EFFICIENCY OF POWER PLANT THROUGH ADSORPTION HEAT PUMP**  
 QU M.(\*), ABDELAZIZ O.(\*\*)  
 (\*) *Purdue University, United States, (\*\*)* *Oak Ridge National Laboratory, United States*
- 16:50 402 PERFORMANCE PREDICTION OF A COMPACT SORPTION HEAT STORAGE PROTOTYPE USING LiCl/H<sub>2</sub>O AS WORKING PAIR**  
 YU N., WANG R., WANG L.  
*Institute of Refrigeration and Cryogenics and Key Laboratory of Power Mechanical Engineering, MOE China, Shanghai Jiao Tong University, China*

**GAS PROCESSING AND PURIFICATION**

**A2-Th-4 Room 418**

Chairs: BELADJINE B. M. (*Université des sciences et technologie d'Oran-USTO, Algeria*)  
 WU J. (*Xi'an Jiaotong University, China*)

- 15:30 103 PRODUCTION OF STABLE NEON ISOTOPE BY THE METHOD OF LOW TEMPERATURE RECTIFICATION**  
 BONDARENKO V.(\*), PODDUBNA M.(\*\*), SYMONENKO I.(\*\*\*), ARKHAROV A.(\*)  
 (\*) *Moscow State Technical University, Russia, (\*\*)* *Institute of Refrigeration, Cryotechnology and Ecoenergetics, Ukraine, (\*\*\*)* *Iceblick-Engineering, Ukraine*
- 15:50 290 OPTIMIZATION OF ADSORBERS USED IN PURIFICATION TECHNOLOGIES OF RARE GASES**  
 BONDARENKO V.(\*), BONDARENKO A.(\*\*), PODDUBNA M.(\*\*), SYMONENKO I.(\*\*\*), ARKHAROV I.(\*)  
 (\*) *Moscow State Technical University, Russia, (\*\*)* *Institute of Refrigeration, Cryotechnology and Ecoenergetics, Ukraine, (\*\*\*)* *Iceblick-Engineering, Ukraine*
- 16:10 Withdrawn**
- 16:30 720 PARAMETER OPTIMIZATION OF SUCCESSIVE STAGES OF THE TECHNOLOGY FOR OBTAINING <sup>3</sup>HE ISOTOPE FROM NATURAL HELIUM**  
 BONDARENKO V. L., GRAFOV A. P., KUPRIYANOV M. Y.  
*MSTU, Russia*

**WORKSHOP: RISK ASSESSMENT OF MILDLY FLAMMABLE REFRIGERANTS**  
**WS9-Th-3/WS9-Th-4 Room 304**

Chairs: HIHARA E. (*The University of Tokyo, Japan*)  
 FUJIMOTO S. (*The Japan Refrigeration and Air Conditioning Industry Association (JRAIA), Daikin Industries, Ltd., Japan*)

**FRIDAY, AUGUST 21**

**8:30-10:10**

**CONDENSATION(1)**

**B1-Fr-1a Room 301**

Chairs: DEL COL D. (*University of Padova, Italy*)  
 PENG H. (*The University of Tokyo, Japan*)

- 8:30 165 CONDENSATION HEAT TRANSFER OF LOW GWP REFRIGERANTS R1234ZE(E), R1234ZE(Z) AND R1233ZD(E) ON A HORIZONTAL PLAIN TUBE**  
 NAGATA R.(\*), KONDOU C.(\*\*), KOYAMA S.(\*\*\*,\*\*\*\*)  
 (\*) *Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Japan, (\*\*)* *Graduate School of Engineering, Nagasaki University, Japan, (\*\*\*)* *Faculty of Engineering Sciences, Kyushu University, Japan, (\*\*\*\*)* *International Institute for Carbon-Neutral Energy Research (WPI-I2CNER), Kyushu University, Japan*



**8:50 635 CONDENSATION HEAT TRANSFER CHARACTERISTICS OF LOW-GWP REFRIGERANTS IN HORIZONTAL SMOOTH MINI TUBE**  
LI M.(\*), LV J.(\*), DANG C.(\*\*), GU H.(\*)  
(\* Key Laboratory of Efficient Utilization of Low and Medium Grade Energy, MOE, Tianjin University, China, (\*\* Department of Human and Engineered Environmental Studies, Graduate School of Frontier Sciences, The University of Tokyo, Japan)

**9:10 368 AN EXPERIMENTAL STUDY OF CONDENSATION HEAT TRANSFER USING R410A IN A MULTIPORT EXTRUDED TUBE**  
PHAM Q. V.(\*), CHOI K.-I.(\*\*), OH J.-T.(\*\*), CHO H.(\*\*\*), KIM T.(\*\*\*), KIM J.(\*\*\*), CHOI J.(\*\*\*)  
(\* Graduate School, Chonnam National University, South Korea, (\*\* Department of Refrigeration and Air Conditioning Engineering, Chonnam National University, South Korea, (\*\*\*) Advanced R&D Team, Digital Appliances, Samsung Electronics, South Korea)

**9:30 515 EXPERIMENTAL INVESTIGATIONS OF PROPANE MINICHANNEL CONDENSER**  
GAGAN J., BUTRYMOWICZ D., DUDAR A., ŁUKASZUK M., ŚMIERCIEW K.  
Białystok University of Technology, Poland

#### FROST(1)

##### B1-Fr-1b Room 303

Chairs: HERMES C. (Federal University of Parana, Brazil)  
POPOVAC M. (Austrian Institute of Technology, Austria)

**8:30 77 STATE-OF-THE ART OF FROST DEPOSITION ON FLAT SURFACES**  
LEONI A.(\*\*,\*) , MONDOT M.(\*\*), DURIER F.(\*\*), REVELLIN R.(\*), HABERSCHILL P.(\*)  
(\* Université de Lyon, CNRS, INSA-Lyon, Université Lyon 1, CETHIL UMR5008, France, (\*\* Centre Technique des Industries Aéronautiques et Thermiques (CETIAT), Domaine scientifique de la Doua, France)

**8:50 389 STUDY ON CONTROL AND INHIBITION OF FROST FORMATION ON A FLAT PLATE**  
MATSUSHITA S.(\*), KATO M.(\*), OHKUBO H.(\*\*), NISHIDA K.(\*)  
(\* MAYEKAWA MFG.CO., LTD., Japan, (\*\* Tamagawa University, Japan)

**9:10 462 STUDY ON THE FROSTING PHENOMENA BETWEEN CONCAVITY AND CONVEXITY PLATE UNDER FORCED CONVECTION -ANALYSIS OF FROST LAYER GROWTH-**  
KANEKO A.(\*), TAKANO Y.(\*\*), MIYAHARA R.(\*\*), MORITA K.(\*\*\*), KATSUTA M.(\*\*\*)  
(\* Automotive Product Development Department, SANDEN ADVANCED TECHNOLOGY CORPORATION, Japan, (\*\* Graduate School of Environment and Energy Engineering, Waseda University, Japan, (\*\*\*) Department of Modern Mechanical Engineering, Waseda University, Japan)

**9:30 656 EFFECTS OF WEAK MAGNETIC FIELDS ON FROSTING PROCESS ON SURFACE OF COPPER TUBE**  
ZHAO H.(\*), WANG L.(\*\*), LAI Y.(\*), HAN J.(\*), LI W.(\*)  
(\* School of Power and Energy, Shandong University, China, (\*\* School of Control Science and Engineering, Shandong University, China)

**9:50 712 THERMAL PERFORMANCE OF LOUVERED FIN-TUBE HEAT EXCHANGER UNDER FROSTING CONDITION**  
LIM J.(\*), PARK W.(\*), CHO K.(\*\*)  
(\* Graduate School of Mechanical Engineering, Sungkyunkwan University, South Korea, (\*\* School of Mechanical Engineering, Sungkyunkwan University, South Korea)

#### HEAT-PUMP BASED ENERGY RECOVERY SYSTEM(1)

##### E2-Fr-1 Room 313+314

Chairs: GIANNETTI N. (Department of Applied Mechanics and Aerospace Engineering, Waseda University, Japan)  
MIYAOKA Y. (Chubu Electric Power Co., Inc., Japan)

**8:30 252 DIESEL ENGINE HEAT PUMP PERFORMANCE ANALYSIS FOR A DOMESTIC RETROFIT APPLICATION**  
SHAH N., HUANG M., HEWITT N.  
Centre for Sustainable Technologies, University of Ulster, United Kingdom

**8:50 588 EJECTOR REFRIGERATION SYSTEMS FOR WASTE HEAT RECOVERY APPLICATIONS: EFFECTS OF CONDENSATION ON PERFORMANCE**  
LITTLE A. B., GARIMELLA S.  
George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, United States

**9:10 599 A R-32 TRANSCRITICAL HEAT PUMP FOR HIGH TEMPERATURE INDUSTRIAL APPLICATIONS**  
BESBES K.(\*\*,\*) , ZOUGHAIB A.(\*), DE CARLAN F.(\*\*), PEUREUX J.-L.(\*\*)  
(\* MINES ParisTech, PSL Research University, CES - Center for Energy efficiency of Systems, France, (\*\* EDF, Électricité de France, Laboratoire Les Renardières, France)

**9:30 784 DEVELOPMENT OF A HIGH TEMPERATURE HEAT PUMP FOR HEAT RECOVERY IN DYEING INDUSTRY**  
WU X.(\*), TANG H.(\*), CHEN W.(\*\*), WANG X.(\*\*\*), XING Z.(\*)  
(\* School of Energy and Power Engineering, Xi'an Jiaotong University, China, (\*\* Suzhou Academy, Xi'an Jiaotong University, China, (\*\*\*) School of Engineering & ICT, University of Tasmania, Australia)

**9:50 797 HEAT TRANSFER CHARACTERISTICS OF PLATE ABSORBER FOR COMPRESSION/ABSORPTION HYBRID HEAT PUMP APPLICATION**  
JUNG C. W., LEE J. H., KANG Y. T.  
School of Mechanical Engineering, Korea University, South Korea

#### A/C FOR MOBILE / EJECTOR

##### E1-Fr-1 Room 411+412

Chairs: ELBEL S. (University of Illinois, United States)  
BAE S. (Waseda University Environmental Research Institute, Japan)

**8:30 137 AN EXPERIMENTAL COMPARISON BETWEEN PERFORMANCES OF MODULAR SILICON EXPANSION VALVE AND THERMAL EXPANSION VALVE IN MOBILE AC SYSTEM**  
ZHANG Z., ZHU J., LI W., ZHANG C., CHEN J.  
Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University, China

**8:50 93 THE STUDY OF FUZZY CONTROL APPLIED TO VARIABLE REFRIGERANT FLOW TEMPERATURE CONTROL FOR ELECTRIC VEHICLE AIR CONDITION SYSTEM**  
HUANG C. K., CHEN J. L., LIN J. Y., CHU M. H., CHEN Y. W.  
*Department of Energy Refrigerating and Air-Conditioning Engineering, Tung Nan University, Taiwan*

**9:10 193 NUMERICAL INVESTIGATION OF EVAPORATOR DESIGN IN THE EJECTOR REFRIGERATION CYCLE WITH R134a AND CO<sub>2</sub>**  
LAWRENCE N., ELBEL S.  
*Air Conditioning and Refrigeration Center, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, United States*

## SYSTEM & CAPACITY CONTROL

### B2-Fr-1a Room 413

Chairs: SEKITA M. (*Japan Society of Refrigerating and Air Conditioning Engineers, JSRAE, Japan*)

NAVARRO-PERIS E. (*Universidad Politecnica de Valencia, Spain*)

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**8:30 199 DRY-BULB AND WET-BULB TEMPERATURE ALLOWANCES CORRECTION BASED ON WEIGH ANALYSIS**  
ZHANG Z. (\*), HUANG H. (\*\*), HUANG Y. (\*), ZHANG J. (\*), JIANG Y. (\*), FENG Z. (\*\*)  
*(\*) Jiangsu Post and Telecommunications Planning and Designing Institute Co., Ltd, China, (\*\*) Engineering Laboratory of Energy System Conversion and Emission Reduction of Jiangsu Province, School of Energy and Mechanical Engineering, Nanjing Normal University, China*

**8:50 834 EVALUATION OF CCHP SYSTEMS FUELLED BY MIXTURE OF BIOGAS AND LPG BASED ON DIFFERENT THERMALLY ACTIVATED CHILLERS**  
LI C., WANG J., WU J.  
*Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University, China*

**9:10 16 INTELLIGENT CAPACITY CONTROL POTENTIAL FOR SYSTEM EFFICIENCY IMPROVEMENTS & ENERGY SAVINGS**  
PFEIL H. V.  
*BITZER K hlmaschinenbau GmbH, Germany*

**9:30 145 APPLYING VARIABLE FREQUENCY DRIVES TO AIR UNITS IN INDUSTRIAL REFRIGERATION SYSTEMS**  
REINDL D. (\*), JEKEL T. (\*\*), DAVIS J. (\*\*\*)  
*University of Wisconsin-Madison, Industrial Refrigeration Consortium, United States*

**9:50 300 SUBCOOLING CONTROL: A WAY TO ENHANCE THE PERFORMANCE OF CONDENSERS FOR HOT WATER PRODUCTION WITH A HIGH WATER TEMPERATURE GLIDE**  
CORBER N J. M., GONZ LVEZ-MACI  J., NAVARRO-PERIS E., PITARCH-MOCHOL  M., L PEZ-NAVARRO A.  
*Universitat Polit cnica de Val ncia, Institute for Energy Engineering, Spain*

## SECONDARY REFRIGERANT(2)

### B2-Fr-1b Room 414+415

Chairs: KAWANAMI T. (*Kobe University, Japan*)

KAUFFELD M. (*Karlsruhe University of Applied Sciences, Germany*)

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**8:30 565 ETHYL AND ISOPROPYL ALCOHOL BLENDS AS ALTERNATIVE SECONDARY FLUIDS**  
IGNATOWICZ M., MELINDER  ., PALM B.  
*KTH Royal Institute of Technology, Sweden*

**8:50 435 THERMODYNAMIC MODELLING OF FORMATION/DISSOCIATION CYCLES OF TWO-PHASE SLURRIES IN SECONDARY REFRIGERATION SYSTEM**  
HOANG H. M. (\*), DELAHAYE A. (\*), FOURNAISON L. (\*), OIGNET J. (\*), DE ROM MONT C. (\*\*), PONS M. (\*\*\*)  
*(\*) Irstea, UR GPAN, France, (\*\*)  cole des Ponts ParisTech, France, (\*\*\*) LIMSI-CNRS, UPR3251, France*

**9:10 892 IIR HANDBOOK ON INDIRECT REFRIGERATION AND HEAT PUMP SYSTEMS**  
MELINDER  ., GRANRYD E.  
*Department of Energy Technology, Royal Institute of Technology, KTH, Sweden*

**9:30 116 USE OF COOLANTS AT PHASE TRANSITION FOR FOODSTUFFS REFRIGERATION**  
BELOZEROV G. (\*), MEDNIKOVA N. (\*), PYTCHENKO V. (\*), UMANSKIY V. (\*\*), KOLESNIKOV A. (\*\*), KROTOV A. (\*\*), KLYACHKO L. (\*\*)  
*(\*) FGBNU Russian Scientific Research Institute for Refrigeration Industry (VNIKHI), Russia, (\*\*) Central Scientific-Research Institute "Kurs" (CSRI "Kurs"), Russia*

**9:50 724 COMPARISON OF PERFORMANCES OF DRYING TECHNIQUES OF SURFACES IN AGRO FOOD PREMISES**  
GUILPART J. (\*), TCHAIKOWSKI A. (\*\*), LECOQ L. (\*\*\*)  
*(\*) IIR, MF Conseil, France, (\*\*) DESSICA, France, (\*\*\*) IRSTEA - Refrigeration Processes Engineering Research Unit, France*

## NH3

### D1-Fr-1 Room 416+417

Chairs: VALLEE C. (*Carrier Commercial Refrigeration, Germany*)

HOKAMURA T. (*Mitsubishi Heavy Industries Air-Conditioning & Refrigeration Corporation, Japan*)

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**8:30 KEYNOTE EXPERIENCES IN RENEWAL OF COLD STORAGE FACILITIES FROM R22 TO NH<sub>3</sub>/CO<sub>2</sub> IN JAPAN**  
KAWAMURA K.  
*Mayekawa Mfg. Co., Ltd., Japan*

**9:10 763 SECURING SAFETY, ENERGY EFFICIENCY AND LONG-TERM INVESTMENT ALONG THE FOOD COLD CHAIN BY USING NATURAL REFRIGERANTS: A COMPARATIVE MARKET, POLICY AND TECHNOLOGY ANALYSIS OF NORTH AMERICA, JAPAN, CHINA AND VIET NAM**  
DUSEK J. (\*), MASSON N. (\*), SKACANOVA K. (\*\*)  
*(\*) Shecco Japan K.K., Japan, (\*\*) Shecco, Belgium*

**9:30 900 RECENT ADVANCES IN AMMONIA DRY EXPANSION APPLICATIONS**  
JENSEN S. S.  
*Scantec Refrigeration Technologies Pty. Ltd., Australia*

- 9:50 412 DETECTION METHOD OF AMMONIA LEAKAGE FROM LIQUID LINE OF COLD STORAGE REFRIGERATION SYSTEM BASED ON PRESSURE AND FLOW RATE**  
 TIAN S.(\*,\*\*), DU J.(\*\*\*), GAO Y.(\*,\*\*), SHAO S.(\*), TANG M.(\*), ZOU H.(\*)  
 (\*) Beijing Key Laboratory of Thermal Science and Technology, Key Laboratory of Cryogenics, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, China, (\*\*) University of Chinese Academy of Sciences, China, (\*\*\*) Henan University of Animal Husbandry and Economy, China

#### **GAS LIQUIFACTION**

##### **A2-Fr-1 Room 418**

Chairs: SARKAR S. C. (Centre for Rural & Cryogenic Technologies, Jadavpur University, India)  
 PODDUBNA M. (Institute of Refrigeration, Cryotechnology and Ecoenergetics, Ukraine)

- 8:30 291 A SMALL-SCALE NATURAL GAS LIQUEFACTION PROCESS UTILIZING THE PRESSURE ENERGY OF THE HIGH-PRESSURE PIPELINES**  
TAN H., ZHENG J., SUN N., LI Y.  
 Department of Refrigeration and Cryogenic Engineering, School of Energy and Power Engineering, Xi'an Jiaotong University, China
- 8:50 446 THE EXERGY ANALYSIS OF NGE-MR NATURAL GAS LIQUEFACTION PROCESS**  
WANG X., WU J., MENG X., BI S.  
 Key Laboratory of Thermo-Fluid Science and Engineering, Ministry of Education, Xi'an Jiaotong University, China
- 9:10 553 EXERGY ANALYSIS OF AN ETHYLENE BOG RE-LIQUEFACTION SYSTEM**  
 OUADHA A., BELADJINE B. M.  
 Département de Génie Maritime, Faculté de Génie Mécanique, Université des Sciences et de la Technologie Mohamed BOUDIAF d'Oran (USTO-MB), Algeria
- 9:30 504 THE FEASIBILITY OF LIQUID BIOGAS (LBG) IN ITALY**  
 ARTECONI A.(\*), SPITONI M.(\*\*), POLONARA F.(\*\*)  
 (\*) Università Telematica e-Campus, Italy, (\*\*) Dipartimento di Ingegneria Industriale e Scienze Matematiche, Università Politecnica delle Marche, Italy

#### **WORKSHOP: IIR WORKING PARTY ON LIFE CYCLE CLIMATE PERFORMANCE EVALUATION**

##### **WS11-Fr-1 Room 304**

Chair: HWANG Y. (University of Maryland, IIR LCCP WP, United States)

**FRIDAY, AUGUST 21**

**10:30-12:10**

#### **CONDENSATION(2)**

##### **B1-Fr-2a Room 301**

Chairs: BUTRYMOWICZ D. (Bialystok University of Technology, Poland)  
 MIYARA A. (Saga University, Japan)

- 10:30 711 TWO PHASE HEAT TRANSFER AND FLOW REGIMES OF R134A AND R410A DURING CONDENSATION IN HORIZONTAL MICRO-FIN TUBES**  
 KUKREJA R.(\*), JAIN S.(\*\*), AGGARWAL R. S.(\*\*\*)  
 (\*) Department of Mechanical Engineering, National Institute of Technology, India, (\*\*) Department of Mechanical Engineering, Indian Institute of Technology, India, (\*\*\*) HCFC Phase-out, Project "Montreal Protocol" Ozone Cell, India Habitat Centre, India
- 10:50 163 EXPERIMENTAL STUDY ON CONDENSATION HEAT TRANSFER OF R32/R290 MIXTURE IN HORIZONTAL TUBES**  
 HAN B., LIU F., CAI D., TIAN Q., HE G.  
 School of Energy and Power Engineering, Huazhong University of Science and Technology, China
- 11:10 174 MODELLING OF IN-TUBE BINARY MIXTURES CONDENSATION IN ANNULAR-MIST FLOW WITH ENTRAINMENT AND DEPOSITION**  
DENG H., FERNANDINO M., DORAO C. A.  
 Norwegian University of Science and Technology, Norway
- 11:30 246 NUMERICAL MODEL FOR WATER VAPOUR CONDENSATION ON HYDROPHILIC COATING ENHANCED FIN SURFACE UNDER DEHUMIDIFYING CONDITION**  
 ZHUANG D.(\*), YANG Y.(\*), DING G.(\*), HU H.(\*), FUJINO H.(\*\*), INOUE S.(\*\*)  
 (\*) Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University, China, (\*\*) Daikin Industries, Ltd., Japan
- 11:50 260 NUMERICAL SIMULATION OF NITROGEN CONDENSATION FLOW IN A CRYOGENI NOZZLE**  
WAN S., GUOQING L., LU N., SHUANGTAO C., YU H.  
 State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University, China
- FROST(2)**  
**B1-Fr-2b Room 303**  
 Chairs: CHO K. (Sungkyunkwan University, South Korea)  
 ENOKI K. (The University of Electro-Communications, Japan)
- 10:30 18 LUMPED HEAT AND MASS TRANSFER MODEL OF THE FROST FORMATION PROCESS**  
 MOHS W. F.(\*), KULACKI F. A.(\*\*)  
 (\*) SKOPE Ind Ltd., New Zealand, (\*\*) Department of Mechanical Engineering, University of Minnesota, United States
- 10:50 35 THERMAL CONDUCTIVITY OF FROST: LITERATURE REVIEW AND CORRELATION OF DATA**  
 NEGRELLI S., HERMES C. J. L.  
 Laboratory of Thermodynamics and Thermophysics, Federal University of Paraná, Brazil

- 11:10 441 FLAT-TUBE HEAT EXCHANGER MODELING UNDER FROSTING CONDITIONS FOR AN ELECTRIC VEHICLE HEAT PUMP**  
BREQUE F., NEMER M.  
 MINES ParisTech, PSL Research University, Center for energy Efficiency of Systems, France
- 11:30 28 NUMERICAL ANALYSIS OF THE FROSTING PERFORMANCE OF THE AIR-SIDE OF A HEAT PUMP**  
POPOVAC M., SEICHTER S., BENOVSKY P., FLECKL T., REICHL C.  
 Austrian Institute of Technology, Energy Department, Austria
- 11:50 118 EXPERIMENTAL STUDY OF HEAT AND MASS TRANSFER IN MODIFIED ICE STRUCTURES RESULTED FROM DIFFUSION OF POLYMERIC COMPOUNDS USED FOR SPORTS ICE OBJECTS**  
GONCHAROVA G.(\*), USTUGOVA T.(\*), NIKIFOROVA I.(\*), RAZOMASOV N.(\*\*)  
 (\* GP "Refrigerating - Engineering Center", Russia, (\*\*) Moscow State Technical University, Russia

**HEAT-PUMP BASED ENERGY RECOVERY SYSTEM(2) / SORPTION SYSTEMS (ABSORPTION, ADSORPTION, DEC)(3)**

**E2-Fr-2 Room 313+314**

Chairs: YAMAGUCHI S. (Waseda University, Japan)

TBD

- 10:30 848 INFLUENCE OF GROUNDWATER FLOW ON IMPLEMENTATION OF DISTRIBUTED THERMAL RESPONSE TEST**  
BOBAN L., LEPOŠA L., SOLDO V., GROZDEK M.  
 University of Zagreb - Faculty of Mechanical Engineering and Naval Architecture, Croatia
- 10:50 155 A NEW GROUND-COUPLED HEAT PUMP SYSTEM INTEGRATED WITH MULTI-MODE AIR-WATER HEAT EXCHANGER TO ELIMINATE THERMAL IMBALANCE**  
YOU T., SHI W., WU W., WANG B., LI X.  
 Department of Building Science, School of Architecture, Tsinghua University, China
- 11:10 477 THERMAL PERFORMANCE OF GROUND SOURCE HEAT PUMPS THAT USE DIRECT EXPANSION SYSTEM**  
TAKEDA T., TANAKA D., YOKOYAMA D., ISHIGURO S., FUNATANI S., ICHIMIYA K.  
 University of Yamanashi, Japan
- 11:30 764 ABSORPTION HEAT CONVERTER AND THE CHARACTERISTIC EQUATION METHOD**  
CUDOK F., ZIEGLER F.  
 Technische Universität Berlin, Institute of Energy Conversion Engineering, Germany
- 11:50 719 MODELING AND EXPERIMENTAL INVESTIGATION OF A PILOT-SCALE ADSORPTION CHILLER USING LOW-TEMPERATURE HEAT FROM COGENERATION**  
CHOROWSKI M., PYRKA P.  
 Wrocław University of Technology, Department of Cryogenic, Aviation and Process Engineering, Poland

**OTHERS(2)**

**E1-Fr-2 Room 411+412**

Chairs: NAGAI T. (Tokyo University of Science, Japan)

MIYAOKA Y. (Chubu Electric Power Co., Inc., Japan)

- 10:30 94 THE TEMPERATURE CONTROL OF CHILLED WATER FOR THE CENTRAL AIR CONDITIONING SYSTEMS**  
CHU M. H.(\*), CHEN Y. W.(\*), HUANG C. K.(\*), YANG C. S.(\*\*)  
 (\*) TNU, Taiwan, (\*\*) Far East University, Taiwan
- 10:50 415 RESEARCH ON DOMESTIC AIR CONDITIONERS LONG-TERM PERFORMANCE AND EVALUATION INDEX**  
WU J., LIU C., LIANG Z., ZHANG C.  
 South China University of Technology, School of Mechanical and Automotive Engineering, China
- 11:10 597 EFFECT OF INSTALLATION FAULTS ON THE PERFORMANCE OF A SPLIT AIR CONDITIONER**  
DOMANSKI P. A.(\*), HENDERSON H. I.(\*\*), PAYNE W. V.(\*)  
 (\*) National Institute of Standards and Technology, United States, (\*\*) CDH Energy Corporation, United States
- 11:30 442 EFFECT OF ENERGY-SAVING LAMPS ON AIR-CONDITIONING LOAD BUSINESS-RELATED BUILDING**  
MIYAOKA Y.(\*), NAKAYAMA H.(\*), HIROTA M.(\*\*), ONISHI M.(\*\*), YOSHIZAWA N.(\*\*\*), TADOKORO T.(\*\*\*)  
 (\*) Chubu Electric Power Co., Inc., Japan, (\*\*) Mie University, Department of Mechanical Engineering, Japan, (\*\*\*) Tokyo University of Science, Department of Architecture, Japan
- 11:50 942 INVESTIGATION OF THE DISPERSION STABILITY CHARACTERISTICS OF NANO-COMPOSITE PCM FOR USE IN A STORAGE TANK OF CONVENTIONAL AIR-CONDITIONING SYSTEM**  
LI X.-Y., ZHAO Q., QU D., LI T., LI K., MA B.  
 School of Energy and Building Engineering, Harbin University of Commerce, China

**OTHERS(2)**

**B2-Fr-2a Room 413**

Chairs: TAKAISHI Y. (Kanagawa Institute of Technology, Japan)

WU J. Y. (Shanghai Jiao Tong University, China)

- 10:30 759 FAULT DETECTION AND DIAGNOSIS OF A REFRIGERATION SYSTEM USING PROBABILISTIC NEURAL NETWORK**  
LIANG Q., HAN H., CUI X., REN H.  
 Institute of Refrigeration and Cryogenics, School of Energy and Power Engineering, University of Shanghai for Science and Technology, China
- 10:50 294 STUDY ON THE SUPPORT VECTOR DATA DESCRIPTION (SVDD)-BASED CHILLER SENSOR FAULT DETECTION EFFICIENCIES**  
LI G.(\*), HU Y.(\*), CHEN H.(\*), LI H.(\*\*)  
 (\*) School of Energy and Power Engineering, Huazhong University of Science and Technology, China, (\*\*) University of Nebraska-Lincoln, United States

**11:10 498 ANALYSIS OF LEAKAGE OF REFRIGERANTS IN REFRIGERATED INSTALLATIONS**  
DEVIN E.(\*), MICHINEAU T.(\*), FOURNAISON L.(\*\*), DELAHAYE A.(\*\*), LEDUCQ D.(\*\*), HUNLEDE R.(\*\*)  
(\* Cemafruid, France, (\*\* Irstea, France)

**11:30 521 SOUND PREFERENCE DEVELOPMENT AND CORRELATION TO SERVICE INCIDENCE RATE**  
HARDESTY T.(\*), CERRATO G.(\*\*), FREEMAN T.(\*\*), FRANK E.(\*\*)  
(\* Sub-Zero Inc., United States, (\*\* Sound Answers, United States)

**11:50 868 SIMULATOR FAILURES OF REFRIGERATION SYSTEMS: INNOVATIVE TEACHING TOOL SIMULATEUR DES PANNES DES INSTALLATIONS FRIGORIFIQUES: OUTIL PEDAGOGIQUE INNOVANT**  
BOUZRARA A.(\*), KAIRAOUANI L.(\*\*), NEHDI E.(\*\*)  
(\* ISPA, Tunisia, (\*\* ENIT, Tunisia)

## CO2 SYSTEM

### B2-Fr-2b Room 414+415

Chairs: HIROTA M. (Mie University, Japan)

FIKIIN K. (Technical University of Sofia, Bulgaria)

**10:30 15 CO<sub>2</sub> AS A REFRIGERANT – START RIGHT AWAY!**  
JAVERSCHEK O.(\*), CRAIG J.(\*\*), XIAO A.(\*\*)  
(\* BITZER Kühlmaschinenbau GmbH, Germany, (\*\* BITZER Australia Pty. Ltd., Australia)

**10:50 168 R744 REFRIGERATION TECHNOLOGIES FOR SUPERMARKETS IN WARM CLIMATES**  
HAFNER A., HEMMINGSEN A. K.  
SINTEF Energy Research, Norway

**11:10 530 THEORETICAL ANALYSIS OF CO<sub>2</sub> TRANS-CRITICAL SYSTEM WITH PARALLEL COMPRESSION FOR HEAT RECOVERY AND AIR CONDITIONING IN SUPERMARKETS**  
KARAMPOUR M., SAWALHA S.  
Royal Institute of Technology (KTH), Sweden

**11:30 605 EXPERIMENTAL INVESTIGATION ON THE USE OF INTERNAL HEAT EXCHANGERS IN VARIABLE-CAPACITY CARBON DIOXIDE REFRIGERATING SYSTEMS**  
DE CARVALHO B. Y. K.(\*), MELO C.(\*), PEREIRA R. H.(\*\*)  
(\* POLO – Research Laboratories for Emerging Technologies in Cooling and Thermophysics, Federal University of Santa Catarina, Department of Mechanical Engineering, Brazil, (\*\* The Coca-Cola Company, United States)

## CO2

### D1-Fr-2 Room 416+417

Chairs: FOSTER A. M. (London South Bank University, United Kingdom)

KOJIMA S. (Mitsubishi Heavy Industries Air-Conditioning & Refrigeration Corporation, Japan)

**10:30 272 LOW TEMPERATURE HEAT STORAGES IN CO<sub>2</sub> SUPERMARKET REFRIGERATION SYSTEMS**  
FIDORRA N.(\*), HAFNER A.(\*\*), MINETTO S.(\*\*\*), KÖHLER J.(\*)  
(\* University of Braunschweig, Germany, (\*\* SINTEF Energy Research, Norway, (\*\*\*) National Research Council -Construction Technologies Institute, Italy)

**10:50 303 LOW-CHARGE PROPANE REFRIGERATION SYSTEM TECHNOLOGY FOR SINGLE AND MULTI-DOOR BOTTLE COOLERS**  
PADILLA FUENTES Y.(\*), HRNJAK P.(\*), ELBEL S.(\*\*)  
(\* Creative Thermal Solutions, Inc., United States, (\*\* University of Illinois at Urbana-Champaign, Department of Mechanical Science and Engineering, United States)

**11:10 305 HIGH-EFFICIENCY, LOW-COST GLASS DOOR MERCHANDISERS USING TRANSCRITICAL CARBON DIOXIDE**  
PADILLA FUENTES Y.(\*), HRNJAK P.(\*), ELBEL S.(\*\*)  
(\* Creative Thermal Solutions, Inc., United States, (\*\* University of Illinois at Urbana-Champaign, Department of Mechanical Science and Engineering, United States)

**11:30 339 WATER STORAGE TO IMPROVE THE EFFICIENCY OF CO<sub>2</sub> COMMERCIAL REFRIGERATION SYSTEMS**  
POLZOT A., D'AGARO P., GULLO P., CORTELLA G.  
DIEG - University of Udine, Italy

**11:50 652 PERFORMANCE INDICATORS FOR ENERGY EFFICIENT SUPERMARKET BUILDINGS**  
VAN DER SLUIS S.(\*), LINDBERG U.(\*\*), LANE A.-L.(\*\*), ARIAS J.(\*\*\*)  
(\* Saint Trofee, Netherlands, (\*\* SP Technical Research Institute of Sweden, Sweden, (\*\*\*) KTH Royal Institute of Technology, Sweden)

## LIQUID HYDROGEN AND AIR-SEPARATION

### A2-Fr-2 Room 418

Chairs: OHIRA K. (Institute of Fluid Science, Tohoku University, Japan)

TAN H. (Xi'an Jiaotong University, China)

**10:30 KEYNOTE DEVELOPMENT FOR ENERGY CARRIER WITH LIQUID HYDROGEN FROM OVERSEAS**  
NISHIMURA M., KAMIYA S., HARADA E.  
Kawasaki Heavy Industries, Ltd., Japan

**11:10 395 MODELING OF CRYOGENIC AIR SEPARATION UNIT USING AN OBJECT-ORIENTED APPROACH AND MODELICA-BASED MODE**  
TIAN Q.(\*), HE G.(\*), CAI D.(\*), TANG W.(\*), CHEN L.(\*\*)  
(\* School of Energy and Power Engineering, Huazhong University of Science and Technology, China, (\*\* CAD Center, Huazhong University of Science and Technology, China)

**11:30 819 A PARALLEL CONNECTION DEVICE TO REDUCE NONUNIFORM FLOW DISTRIBUTION IN THE LARGE-SCALE VERTICAL RADIAL FLOW ADSORBER**  
RUI D., CHEN Y., ZHANG X., QIU L., ZHANG X.  
Institute of Refrigeration and Cryogenics, Zhejiang University, China

## WORKSHOP: ELICIT EU PROJECT

### WS12-Fr-2 Room 304

Chairs: PASTORE A. (CAMFRIDGE, United Kingdom)

COULOMB D. (IIR, France)

**CONDENSATION(3)****B1-Fr-3a Room 301**

Chairs: ONAKA Y. (*Mitsubishi Electric Corporation, Japan*)  
OH J. (*Chonnam National University, South Korea*)

- 13:30 361 CONDENSATION OF R1234ze(Z) INSIDE A VERTICAL PLATE-FIN HEAT EXCHANGER**  
FUKUDA S.(\*), ZHANG H.(\*\*), TAKATA N.(\*\*), MATSUMOTO T.(\*\*\*), KOYAMA S.(\*,\*\*\*\*)  
(\* Faculty of Engineering Sciences, Kyushu University, Japan, (\*\* Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Japan, (\*\*\*) Faculty of Engineering, Kyushu University, Japan, (\*\*\*\*) International Institute for Carbon-Neutral Energy Research, Kyushu University, Japan)
- 13:50 547 PERFORMANCE OF NEW MICROCHANNEL EVAPORATORS AND CONDENSERS FOR AIR CONDITIONING EQUIPMENT**  
ROSSATO M.(\*), CHINELLATO F.(\*), BERNARDINELLO S.(\*), DEL COL D.(\*)  
(\* Department of Industrial Engineering, University of Padova, Italy, (\*\* Blue Box Group S.r.l. – Swegon Group, Italy)
- 14:10 906 ANALYSIS OF LIQUID FILM CHARACTERISTICS FOR GAS-LIQUID ANNULAR FLOW IN MICRO-CHANNEL**  
PENG H., YOSHINAGA Y., DANG C., HIHARA E.  
*Department of Human and Engineered Environment, Graduate School of Frontier Sciences, The University of Tokyo, Japan*
- 14:30 287 EVALUATION OF SINGLE PHASE HEAT TRANSFER CHARACTERISTICS INSIDE MULTI-PORT MINICHANNEL**  
CHIEN N.-B.(\*), CHOI K.-I.(\*\*), OH J.-T.(\*\*), CHO H.(\*\*\*), KIM T.(\*\*\*), KIM J.(\*\*\*), LEE C.(\*\*\*)  
(\* Graduate School, Chonnam National University, South Korea, (\*\* Department of Refrigeration and Air Conditioning Engineering, Chonnam National University, South Korea, (\*\*\*) Advanced R&D Team, Digital Appliances, Samsung Electronics, South Korea)
- 14:50 780 HEAT TRANSFER PERFORMANCE OF PULSATING HEAT PIPE WITH WATER-ETHANOL MIXED WORKING FLUID**  
SUI Y., CUI X., HAN H.  
*School of Energy and Power Engineering, University of Shanghai for Science & Technology, China*

**ICE SLURRY****B1-Fr-3b Room 303**

Chairs: AKASAKA R. (*Kyushu Sangyo University, Japan*)  
FUMOTO K. (*Hirosaki University, Japan*)

- 13:30 384 NUMERICAL SIMULATION ON THE FLOW BEHAVIOR OF ICE SLURRY IN PIPING SYSTEMS**  
LIU S., HAO L.  
*Tianjin Key Laboratory of Refrigeration Technology, Tianjin University of Commerce, China*

- 13:50 552 ICE SLURRY PRODUCTION SYSTEM WITH ABSORPTION TYPE VACUUM FREEZING PRINCIPLE**  
ASAOKA T., ENDO Y., HUANG C.  
*Shinshu University, Japan*
- 14:10 694 CONTROL OF SUPERCOOLING DEGREE DUE TO SURFACTANT**  
FURUDATE Y., MATSUMOTO K., TSUBAKI D.  
*Chuo University, Japan*
- 14:30 725 FLOW AND HEAT TRANSFER CHARACTERISTICS OF MICROENCAPSULATED PHASE CHANGE MATERIAL SLURRY IN HORIZONTAL TUBES**  
ZHANG P., SHI X. J.  
*Institute of Refrigeration and Cryogenics, MOE Key Laboratory for Power Machinery and Engineering, Shanghai Jiao Tong University, China*
- 14:50 529 THERMOPHYSICAL PROPERTIES OF PHASE CHANGE EMULSIONS PREPARED BY D-PHASE EMULSIFICATION METHOD**  
MORIMOTO T., TOGASHI K., KUMANO H.  
*Department of Mechanical Engineering, Aoyama Gakuin University, Japan*

**SORPTION SYSTEMS (ABSORPTION, ADSORPTION, DEC)(4)****E2-Fr-3 Room 313+314**

Chairs: TBD  
SAITO K. (*Waseda University, Japan*)

- 13:30 431 SIMULATION ANALYSIS OF SOLUTION TRANSPORTATION ABSORPTION CHILLER WITH THE CAPACITY FROM 25RT TO 100RT**  
ENOKI K.(\*), TANAKA S.(\*\*), WATANABE F.(\*\*), AKISAWA A.(\*\*), UEDA Y.(\*\*), TAKEI T.(\*\*)  
(\* The University of Electro-Communications, Japan, (\*\* Tokyo University of Agriculture and Technology, Japan)
- 13:50 433 ANALYSIS OF A DIRECTLY FIRED SMALL-SCALE ABSORPTION HEAT PUMP WITH SOLUTION RECIRCULATION AND MULTIPLE FEED OF THE DESORBER**  
WECHSLER R., RIEBERER R.  
*Institute of Thermal Engineering, Graz University of Technology, Austria*
- 14:10 450 EXPERIMENTAL STUDY ON A THREE-BED TWO-STAGE ADSORPTION REFRIGERATION CYCLE USING FAM-Z01 AND Z05 ADSORBENTS**  
TAKAHASHI F.(\*), ENOKI K.(\*), AKISAWA A.(\*), KUBOKAWA S.(\*\*), YOSHIE K.(\*\*), YONEZAWA Y.(\*\*)  
(\* Tokyo University of Agriculture and Technology, Japan, (\*\* Mitsubishi Plastics, Japan)
- 14:30 474 SORPTION AND DESORPTION OF WATER VAPOR ON CALCIUM CHLORIDE-ANODIZED ALUMINA COMPOSITE SORBENTS**  
SUWA Y.(\*), KUMITA M.(\*\*), OTANI Y.(\*\*)  
(\* Graduate School of Natural Science and Technology, Kanazawa University, Japan, (\*\* College of Science and Engineering, School of Natural System, Kanazawa University, Japan)

- 14:50 380 NUMERICAL AND SIMULATION ON NOZZLE PARAMETERS FOR HEAT PUMP SYSTEM USING THERMOBANK AND TWO-PHASE EJECTOR**  
LE C. N. (\*), CHOI G. (\*\*), OH J. (\*\*)  
 (\*) Graduate school, Chonnam National University, South Korea, (\*\*) Department of Refrigeration and Air Conditioning Engineering, Chonnam National University, South Korea

#### CRYOCOOLER

##### A1-Fr-3 Room 411+412

Chairs: ZHU S. (Tongji University, China)  
 HERZOG R. (Institute of Air Handling and Refrigeration, ILK Dresden, Germany)

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- 13:30 KEYNOTE EXPANDING MARKET OF 4KGM CRYOCOOLER**  
IKEYA Y.  
 Sumitomo Heavy Industries, Ltd., Japan
- 14:10 622 THERMODYNAMIC OPTIMIZATION OF A HELICALLY COILED HEAT EXCHANGER FOR JOULE-THOMSON REFRIGERATORS USING RESPONSE SURFACE METHODOLOGY**  
LIU X. (\*), LIU Y. (\*), LI J. (\*\*), CHEN J. (\*\*)  
 (\*) Key Laboratory of Thermo-Fluid Science and Engineering of MOE School of Energy and Power Engineering, Xi'an Jiaotong University, China, (\*\*) Kunming Institute of Physics, China
- 14:30 139 STUDIES ON COILED WIRE FINNED HEAT EXCHANGERS OPERATING WITH WIDE BOILING MIXTURES**  
KRUTHIVENTI S. S. H., VENKATARATHNAM G.  
 Refrigeration and Airconditioning Laboratory, Department of Mechanical Engineering, Indian Institute of Technology, India
- 14:50 850 NEW DESIGNS IN SPECIAL CRYO SYSTEMS AND MOBILE CRYOCOOLERS**  
HERZOG R., KADE A., KLIER J., KLUPSCH M., SCHNEIDER M., SPOERL G.  
 Institut fuer Luft- und Kaeltetechnik gemeinnuetzige Gesellschaft mbH, Germany

#### VORTEX / HEAT EXCHANGE

##### B2-Fr-3a Room 413

Chairs: KOYAMA S. (Kyushu University, Japan)  
 TBD

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- 13:30 275 CHARACTERIZATION OF HEAT TRANSFER IN R134-A SPRAY COOLING**  
LIU J. (\*), QIAN Y. (\*), SHUANGTAO C. (\*\*), HOU Y. (\*), LIU X. (\*\*)  
 (\*) State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University, China, (\*\*) School of Energy and Power Engineering, Xi'an Jiaotong University, China
- 13:50 790 NEW TYPE OF ENERGY EFFICIENT HEAT EXCHANGER FOR INDIRECTLY COOLED DISPLAY CABINETS**  
HAGLUND STIGNOR C. (\*), MARTIN SANTANA S. (\*\*), LARSSON O. (\*)  
 (\*) SP Technical Research Institute of Sweden, Sweden, (\*\*) Airc AB, Sweden

- 14:10 849 DEMONSTRATION OF FREE COOLING WITH CO<sub>2</sub>**  
HEERUP C.  
 Danish Technological Institute, Denmark
- 14:30 299 VORTEX TUBE HEAT BOOSTER TO IMPROVE PERFORMANCE OF HEAT DRIVEN COOLING CYCLES**  
ZHU J., ELBEL S.  
 Air Conditioning and Refrigeration Center, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, United States
- 14:50 592 AN EXPERIMENTAL INVESTIGATION OF THE OPTIMUM GEOMETRY OF TWO NOZZLE COUNTER FLOW VORTEX TUBE**  
VILHEKAR R., AGRAWAL N., NAIK S.  
 Department of Mechanical Engineering, Dr. Babasaheb Ambedkar Technological University, India

#### COOLING USE(1)

##### B2-Fr-3b Room 414+415

Chairs: NISHIMURA N. (Osaka City University, Japan)  
 RIGOLA J. (Universitat Politècnica de Catalunya-BarcelonaTech, Spain)

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- 13:30 276 DEVELOPMENT OF AN INNOVATIVE RAW MILK DISPENSER BASED ON NANOFUID TECHNOLOGY**  
LONGO G. A., RIGHETTI G., ZILIO C.  
 University of Padova, Department of Management and Engineering, Italy
- 13:50 669 DEVELOPMENT OF THE CO<sub>2</sub> REFRIGERATED SHOWCASE**  
ISHIKAWA T., TASHIRO Y.  
 Living Environment Systems Laboratory, Mitsubishi Electric Shizuoka Works, Japan
- 14:10 86 COMPREHENSIVE ASSESSMENT OF CENTRIFUGAL CHILLERS USING NEXT GENERATION REFRIGERANT R1233zd(E)**  
KUJAK S., SCHULTZ K., MAJURIN J.  
 Ingersoll Rand, United States
- 14:30 788 CO<sub>2</sub> COOLING FOR PARTICLE DETECTORS: EXPERIENCES FROM THE CMS AND ATLAS DETECTOR SYSTEMS AT THE LHC, AND PROSPECTS FOR FUTURE UPGRADES**  
BORTOLIN C. (\*), CRESPO-LOPEZ O. (\*), DAGUIN J. (\*), GODLEWSKI J. (\*), NOITE J. (\*), OSTREGA M. (\*\*\*), PAVIS S. (\*), PETAGNA P. (\*), POSTEMA H. (\*), TROPEA P. (\*), VERLAAT B. (\*\*), VOGT S. (\*\*\*), ZIMNY M. (\*\*\*), ZWALINSKI L. (\*)  
 (\*) European Organization for Nuclear Research (CERN), Switzerland, (\*\*) National Institute for Subatomic Physics (NIKHEF), Netherlands, (\*\*\*) Max Planck Institute for Physics (MPI), Germany, (\*\*\*\*) AGH University of Science and Technology, Poland
- 14:50 80 PERFORMANCES OF A REFRIGERATION COMPRESSED AIR DRYER USING A NATURAL REFRIGERANT (R-744)**  
FAVERO C.  
 Hiross Zander Division, Parker Hannifin Manufacturing Srl, Italy

**GLASS DISP / CABINET****D1-Fr-3 Room 416+417**

Chairs: GIANNETTI N. (*Department of Applied Mechanics and Aerospace Engineering, Waseda University, Japan*)  
HATTORI K. (*Mayekawa Mfg, Co., Ltd., Japan*)

- 13:30 749 A NOVEL PASSIVE DEFROST SYSTEM FOR A FROZEN RETAIL DISPLAY CABINET WITH A LOW EVAPORATOR**  
FOSTER A. (\*), CAMPBELL R. (\*\*), DAVIES T. (\*\*), EVANS J. (\*)  
(\* London South Bank University, United Kingdom, (\*\*) Frigesco Ltd, Innovation Centre, University of Exeter, United Kingdom)
- 13:50 486 USE OF PHASE CHANGE MATERIALS IN RETAIL DISPLAY CABINETS TO REDUCE THE EFFECT OF DEFROSTS**  
FOSTER A. (\*), ORLANDI M. (\*\*), BROWN T. (\*), EVANS J. (\*)  
(\* London South Bank University, United Kingdom, (\*\*) Innovation Centre - Epta S.p.A, Italy)
- 14:10 729 ENERGY SAVING POTENTIAL AT PARTIAL LOAD FOR VERTICAL GLASS DOOR REFRIGERATED DISPLAY CABINETS**  
VALLÉE C.  
Carrier Kältetechnik Deutschland GmbH, Germany
- 14:30 50 OPTIMAL CONFIGURATION OF COMPRESSORS IN INDUSTRIAL REFRIGERATION SYSTEMS BASED ON PART-LOAD**  
ZHANG J. (\*, \*\*), WEI D. (\*\*\*)  
(\* Fujian Province Key Lab of Energy Cleaning Utilization and Development, Jimei University, China, (\*\*) Cleaning Combustion and Energy Utilization Research Center of Fujian Province, Jimei University, China, (\*\*\*) Fujian Snowman CO., LTD, China)

**TRUCK****D2-Fr-3 Room 418**

Chairs: LAWTON R. (*Cambridge Refrigeration Technology, United Kingdom*)  
OKU T. (*Mayekawa Mfg, Co., Ltd., Japan*)

- 13:30 KEYNOTE PHARMACEUTICALS COLD CHAIN CHALLENGES**  
CAVALIER G.  
Cemafrroid, France
- 14:10 324 MODELLING AND DEVELOPMENT OF SUSTAINABLE REFRIGERATED ROAD TRANSPORT SYSTEMS**  
FRANCIS C. (\*), DAVIES G. (\*), EVANS J. (\*), MAUGHAN P. (\*\*), SHERWOOD J. (\*\*), MAIDMENT G. (\*)  
(\* London South Bank University, United Kingdom, (\*\*) Hubbard Products Limited, United Kingdom)
- 14:30 59 ASSESSMENT OF NEXT GENERATION REFRIGERANT R452A TO REPLACE R404A FOR TRANSPORT REFRIGERATION PRODUCTS**  
KUJAK S. (\*), BERGE J. (\*\*), MAJURIN J. (\*), KOLDA M., CROMBIE D.  
(\* Ingersoll Rand, United States, (\*\*) Thermo King, United States)
- 14:50 436 NEW REFRIGERANT OPTIONS FOR R404A REPLACEMENT IN TRUCK REFRIGERATION SYSTEMS**  
ZILIO C. (\*), MANCIN S. (\*), BROWN S. J. (\*\*), LONGO G. A. (\*)  
(\* University of Padova, Department of Management and Engineering, Italy, (\*\*) The Catholic University of America, School of Engineering, United States)

**WORKSHOP: MAGNETIC REFRIGERATION FOR COMMERCIAL REFRIGERATED APPLIANCES****WS13-Fr-3 Room 304**

Chair: DELECOURT V. (*Cooltech Applications, France*)

**FRIDAY, AUGUST 21****15:30-17:10****PLATE HEAT EXCHANGER(1)****B1-Fr-4a Room 301**

Chairs: HIROTA M. (*Mie University, Japan*)

GARCÍA-CASCALES J. R. (*Technical University of Cartagena, Spain*)

- 15:30 687 FLOW CHARACTERISTICS OF AIR-WATER TWO PHASE FLOW IN A PLATE HEAT EXCHANGER**  
MAHMUD M. S. (\*), KAWAZOE A. (\*), MUSTAGHFIRIN M. A. (\*\*), KARIYA K. (\*), MIYARA A. (\*)  
(\* Department of Mechanical Engineering, Saga University, Japan, (\*\*) Surabaya Ship Building State Polytechnic, Indonesia)
- 15:50 190 HFC32 VAPORISATION INSIDE A BRAZED PLATE HEAT EXCHANGER (BPHE)**  
LONGO G. A., MANCIN S., RIGHETTI G., ZILIO C.  
University of Padova, Department of Management and Engineering, Italy
- 16:10 189 A NEW MODEL FOR REFRIGERANT BOILING INSIDE A BRAZED PLATE HEAT EXCHANGER (BPHE)**  
LONGO G. A., MANCIN S., RIGHETTI G., ZILIO C.  
University of Padova, Department of Management and Engineering, Italy
- 16:30 551 FLOW BOILING OF R32 INSIDE A BRAZED PLATE HEAT EXCHANGER**  
DEL COL D. (\*), ROSSATO M. (\*), CHINELLATO F. (\*), MUZZOLON A. (\*\*), ROSSETTO L. (\*)  
(\* Department of Industrial Engineering, University of Padova, Italy, (\*\*) Alfa Laval SpA, Italy)
- 16:50 847 MEASUREMENTS OF LOCAL HEAT TRANSFER COEFFICIENT DURING CONDENSATION AND EVAPORATION IN PLATE HEAT EXCHANGER**  
KAWAZOE A., KARIYA K., MIYARA A.  
Department of Mechanical Engineering, Saga University, Japan

**CO2****B1-Fr-4b Room 303**

Chairs: DANG C. (*The University of Tokyo, Japan*)

KONDOU C. (*Nagasaki University, Japan*)

- 15:30 225 EXPERIMENTAL INVESTIGATION ON HEAT TRANSFER AND PRESSURE DROP CHARACTERISTICS OF SUPERCRITICAL CO<sub>2</sub> IN CIRCULAR TUBE**  
XU X., WU Y., LIU C., WANG K.  
Key Laboratory of Low-grade Energy Utilization Technologies and Systems, Chongqing University, Ministry of Education, China



- 15:50 326 EFFECTS OF INPUT PARAMETERS ON PRESSURE LOSS IN THE EVAPORATOR**  
 MAINA P., HUAN Z.  
*Tshwane University of Technology, South Africa*
- 16:10 79 DESIGN AND TEST RESULTS OF A REFRIGERATION COMPRESSED AIR DRYER USING A NATURAL REFRIGERANT (R-744)**  
 FAVERO C.  
*Hiross Zander Division, Parker Hannifin Manufacturing Srl, Italy*
- 16:30 390 OPTIMIZATION ANALYSIS ON R290 /CO2 CASCADE REFRIGERATION SYSTEM**  
 LIU S., CHEN Y., NING J.  
*Tianjin Key Laboratory of Refrigeration technology, Tianjin University of Commerce, China*

**INDUSTRIAL HEAT PUMPS(2) / RESIDENTIAL AND COMMERCIAL HEAT-PUMP SYSTEMS(5)**

**E2-Fr-4 Room 313+314**

Chairs: KIMURA T. (*Japan Society of Refrigerating and Air Conditioning Engineers, Japan*)  
 SASAKI M. (*Tokyo Electric Power Company, Japan*)

- 15:30 824 HIGH EFFICIENT HEAT PUMP SYSTEM USING STORAGE TANKS TO INCREASE COP BY MEANS OF THE ISEC CONCEPT (PART II, THERMAL STORAGE SYSTEM)**  
 OLSEN L.(\*), GAUNAA V.(\*\*), MADSEN C.(\*), OLESEN M. F.(\*)  
 (\*) *Danish Technological Institute, Denmark, (\*\*) Consultant, Denmark*
- 15:50 851 PRELIMINARY STUDY ON ENERGY-SAVING PERFORMANCE OF A TRANSCRITICAL CO<sub>2</sub> HEAT PUMP FOR FOOD PROCESSING INDUSTRY**  
 LIU Y.(\*\*,\*\*), GROLL E. A.(\*\*), YAZAWA K.(\*\*), KURTULUS O.(\*\*)  
 (\*) *University of Shanghai for Science & Technology, School of Energy and Power Engineering, China, (\*\*) Purdue University, School of Mechanical Engineering, United States*
- 16:10 822 GLOBAL TRENDS FOR CO<sub>2</sub> HEAT PUMPS – A STUDY OF MARKET, TECHNOLOGY AND POLICY DRIVERS IN JAPAN, CHINA, NORTH AMERICA AND EUROPE**  
 DUSEK J.(\*), SKACANOVA K.(\*\*), MASSON N.(\*), MAO C.(\*\*)  
 (\*) *shecco Japan K.K., Japan, (\*\*) shecco, Belgium*
- 16:30 943 EXPERIMENTAL STUDY ON SYSTEM PERFORMANCE OF ULTRA-LOW TEMPERATURE CASCADE REFRIGERATION SYSTEM USING CARBON DIOXIDE WITH TAPERED EVAPORATOR/SUBLIMATOR**  
 IWAMOTO Y.(\*), YAMASAKI H.(\*), NIU X.-D.(\*\*), NEKSA P.(\*\*\*), YAMAGUCHI H.(\*)  
 (\*) *Department of Mechanical Engineering, Doshisha University, Japan, (\*\*) Department of Mechatronics Engineering, Shantou University, China, (\*\*\*) SINTEF Energy Research, Norway*
- 16:50 944 THE ROLE OF HEAT PUMPS IN SMART GRIDS**  
 ZAMPOLLO M.(\*), MADANI H.(\*\*), LUNDQVIST P.(\*\*)  
 (\*) *Politecnico di Milano, Italy, (\*\*) KTH Royal Institute of Technology, Sweden*

**SMALL-SCALE CRYOCOOLER**

**A1-Fr-4 Room 411+412**

Chairs: KURIYAMA T. (*TOSHIBA Corporation, Japan*)  
 XUE R. (*Xi'an Jiaotong University, China*)

- 15:30 661 PERFORMANCE INVESTIGATIONS ON 10W/60 K HIGH-CAPACITY, LIGHT-WEIGHT SINGLE-STAGE PULSE TUBE CRYOCOOLERS FOR SPACE APPLICATIONS**  
 DANG H. Z.(\*), SONG Y. Y.(\*), ZHOU B. L.(\*), ZOU R. Q.(\*), TAN J.(\*\*,\*\*), ZHANG L.(\*\*,\*\*), ZHAO Y. B.(\*\*,\*\*), GAO Z. Q.(\*\*,\*\*), BAO D. L.(\*\*,\*\*) (\*) *National Laboratory for Infrared Physics, Shanghai Institute of Technical Physics, Chinese Academy of Sciences, China, (\*\*) University of Chinese Academy of Sciences, China*
- 15:50 351 INVESTIGATIONS ON THE AUTOMATIC TEMPERATURE CONTROL ELECTRONICS OF THE SINGLE STAGE SPACE STIRLING-TYPE PULSE TUBE CRYOCOOLER**  
 TAN J.(\*\*,\*\*), DANG H.(\*), ZHANG L.(\*\*,\*\*), ZHAO Y.(\*\*,\*\*), GAO Z.(\*\*,\*\*), BAO D.(\*\*,\*\*) (\*) *National Laboratory for Infrared Physics, Shanghai Institute of Technical Physics, Chinese Academy of Sciences, China, (\*\*) University of Chinese Academy of Sciences, China*
- 16:10 366 INVESTIGATIONS ON EFFECTS OF THE LINEAR COMPRESSOR'S OUTLET PHASE ANGLE ON THE PULSE TUBE CRYOCOOLER'S PERFORMANCE**  
 ZHANG L.(\*\*,\*\*), DANG H.(\*), TAN J.(\*\*,\*\*), ZHAO Y.(\*\*,\*\*), GAO Z.(\*\*,\*\*), BAO D.(\*\*,\*\*) (\*) *National Laboratory for Infrared Physics, Shanghai Institute of Technical Physics, Chinese Academy of Sciences, China, (\*\*) University of Chinese Academy of Sciences, China*
- 16:30 129 PULSE TUBE REFRIGERATOR WITH DISPLACER FOR NEAR ROOM TEMPERATURE OPERATION**  
 ZHU S.  
*School of Mechanical Engineering, Tongji University, China*
- 16:50 263 INVESTIGATION ON THE MATCHING PERFORMANCE OF A SMALL CRYOGENIC AIR TURBOEXPANDER**  
 YANG S., LI B., LIU G., HOU Y., CHEN S.  
*State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University, China*

**CYCLE CLIMATE**

**B2-Fr-4a Room 413**

Chairs: WATANABE C. (*Chubu Electric Power Co., Inc., Japan*)  
 HAN H. (*University of Shanghai for Science and Technology, China*)

- 15:30 58 F-GAS II REGULATION AND REFRIGERANT EMISSION FORECASTS IN FRANCE LA F-GASII ET SON IMPACT SUR LES ÉMISSIONS DE FLUIDES FRIGORIGÈNES EN FRANCE À L'HORIZON 2035**  
 BARRAULT S., NEMER M.  
*MINES ParisTech, PSL Research University, CES - Center for Energy efficiency of Systems, France*

- 15:50 424 LIFE CYCLE CLIMATE PERFORMANCE ANALYSIS OF SEWAGE SOURCE HEAT PUMP SYSTEMS**  
 CHEN X., ZHANG Z., ZHANG C., LI W., CHEN J.  
*Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University, China*
- 16:10 34 INNOVATIVE SELECTIVE CLIMATE CONTROL SYSTEM FOR HOUSEHOLD REFRIGERATING DEVICES**  
 BAIDAK Y.(\*), BONDARENKO V.(\*\*), KHMELNIUK M.(\*), SMYK V.(\*\*\*)  
 (\* Odessa national academy of food technologies, Ukraine, (\*\* Iceblick, Ltd., Ukraine, (\*\*\*) Odessa Maritime Academy, Ukraine
- 16:30 932 COMPLIANCE WITH FLAMMABILITY REQUIREMENTS FOR AMMONIA REFRIGERATION SYSTEMS**  
 PEARSON A.(\*), YOUNG M.(\*\*)  
 (\* Star Refrigeration Ltd., United Kingdom, (\*\* Maurice Young Consulting, United Kingdom

**COOLING USE(2) / OTHERS(3)**

**B2-Fr-4b Room 414+415**

Chairs: ASAOKA T. (*Shinshu University, Japan*)  
 HAFNER A. (*SINTEF Energy Research, Norway*)

- 15:30 717 EXPERIMENTAL STUDY OF THE INFLUENCE OF CONSUMERS MOVEMENT PARALLEL TO THE FRONTAL OPENING OF MULTIDECK DISPLAY CASE ON THE EVAPORATOR'S THERMAL PERFORMANCE**  
 HEIDINGER G. G.(\*), NASCIMENTO S. M.(\*), GASPAR P. D.(\*\*), SILVA P. D.(\*\*)  
 (\* Eletrofrío Refrigeração Ltda, Brazil, (\*\* University of Beira Interior, Engineering Faculty, Department of Electromechanical Engineering, Portugal
- 15:50 221 COMPARATIVE ASSESSMENT OF HEAT PUMP CYCLE OPERATED WITH R32/R1234ze(E) AND R32/R1234yf MIXTURES**  
 KOJIMA H.(\*), FUKUDA S.(\*\*), KONDOU C.(\*\*), TAKATA N.(\*\*), KOYAMA S.(\*\*, \*\*\*)  
 (\* Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Japan, (\*\* Faculty of Engineering Sciences, Kyushu University, Japan, (\*\*\*) International Institute for Carbon-Neutral Energy Research, Kyushu University, Japan
- 16:10 532 MODELLING OF AMMONIA HEAT PUMP DESUPERHEATERS**  
 CHRISTENSEN S. W.(\*), ELMGAARD B.(\*), MARKUSSEN W. B.(\*), ROTHUIZEN E.(\*), MADSEN C.(\*\*)  
 (\* DTU Technical University of Denmark, Department of Mechanical Engineering, Denmark, (\*\* Danish Technological Institute, Denmark
- 16:30 857 NUMERICAL STUDIES ON PASSIVE VAPOR COMPRESSION CYCLE REGULATING ELEMENTS**  
 ABLANQUE N., OLIET C., RIGOLA J., PEREZ-SEGARRA C.-D.  
*Universitat Politècnica de Catalunya – BarcelonaTech (UPC), Heat and Mass Transfer Technological Center (CTTC), Spain*
- 16:50 107 MODELING OF REFRIGERANT FLOW THROUGH ADIABATIC CAPILLARY TUBES USING NEURAL NETWORK AND RESPONSE SURFACE METHODOLOGY**  
 LI Z., SHAO L., YANG L., ZHANG C.  
*School of Mechanical Engineering, Tongji University, China*

**FOOD**

**D1-Fr-4 Room 416+417**

Chairs: ELBEL S. (*University of Illinois, United States*)  
 JEONG J. (*Waseda University, Japan*)

- 15:30 173 ENERGY ANALYSIS AND HEAT LOADS CALCULATION APPROACH: APPLICATION TO AGRIFOOD INDUSTRIAL PREMISES**  
 GONÇALVES J.(\*), NUNES J.(\*\*), SILVA P. D.(\*), GASPAR P. D.(\*), PIRES L.(\*)  
 (\* Engineering Faculty, University of Beira Interior, Portugal, (\*\* Agriculture School, Polytechnical Institute of Castelo Branco, Portugal
- 15:50 481 SPECIFIC ENERGY CONSUMPTION VALUES FOR VARIOUS REFRIGERATED FOOD COLD STORES**  
 EVANS J.(\*), FOSTER A.(\*), HUET J.-M.(\*\*), REINHOLDT L.(\*\*), FIKIIN K.(\*\*), ZILIO C.(\*\*\*\*), HOUSKA M.(\*\*\*\*\*), LANDFELD A.(\*\*\*\*\*), BOND C.(\*\*\*\*\*), SCHEURS M.(\*\*\*\*\*), VAN SAMBEECK T.(\*\*\*\*\*)  
 (\* Faculty of Engineering, Science and the Built Environment, London South Bank University, United Kingdom, (\*\* Danish Teknologisk Institut, Denmark, (\*\*\*) Technical University of Sofia, Bulgaria, (\*\*\*\* University of Padova, Italy, (\*\*\*\*\* Food Research Institute Prague, Czech Republic, (\*\*\*\*\* Carbon Data Resources Ltd, United Kingdom, (\*\*\*\*\* Catholic University College Limburg, Belgium, (\*\*\*\*\* Coldstore Expertise Center, Netherland
- 16:10 636 EVALUATION OF ENERGY SAVING SCHEMES IN AN APPLE COOL STORE USING COMPUTATIONAL FLUID DYNAMICS**  
 TSIGE A. A.(\*), BESSEMANS N.(\*), GWANPUA S. G.(\*), SCHENK A.(\*\*), DE ROECK A.(\*\*), VERBOVEN P.(\*), NICOLAI B. M.(\*, \*\*)  
 (\* BIOSYST-MeBioS, Katholieke Universiteit Leuven, Belgium, (\*\* Flanders Centre of Postharvest Technology, Belgium
- 16:30 177 OPPORTUNITIES FOR THE ENERGY EFFICIENCY IMPROVEMENT IN THE DAIRY FOOD SECTOR – THE CASE STUDY OF PORTUGUESE TRADITIONAL CHEESE INDUSTRIES**  
 NUNES J.(\*), SILVA P. D.(\*\*), ANDRADE L. P.(\*), DOMINGUES C.(\*\*), GASPAR P. D.(\*\*)  
 (\* Agriculture School, Polytechnical Institute of Castelo Branco, Portugal, (\*\* Engineering Faculty, University of Beira Interior, Portugal

**CONTAINER**

**D2-Fr-4 Room 418**

Chairs: CAVALIER G. (*Cemafroid, France*)  
 HATTORI K. (*Mayekawa Mfg. Co., Ltd., Japan*)

- 15:30 132 STUDY ON THE CAPACITY CONTROL OF A NEWLY-DEVELOPED REFRIGERATION UNIT FOR MARINE CONTAINERS**  
 CHEN W.(\*), HUA K.(\*), YANG M.(\*), ZHENG C.(\*\*)  
 (\* School of Marine Engineering, Jimei University, China, (\*\* Fujian Provincial Key Laboratory of Naval Architecture and Ocean Engineering, China
- 15:50 540 CHILLING INJURY IN GREEN BANANAS DURING REFRIGERATED CONTAINER TRANSPORT**  
 LUKASSE L. J. S., BOER E. P. J.  
*Wageningen UR Food & Biobased Research, Netherlands*

**16:10 582 ALTERNATIVE LOWER GWP REFRIGERANTS FOR HFC-134A IN INTERMODAL REFRIGERATED CONTAINERS**  
LAWTON A. R., RHODES C  
*Cambridge Refrigeration Technology, United Kingdom*

**16:30 314 MAPPING OF THE HEAT FLUX OF AN INSULATED SMALL CONTAINER BY INFRARED THERMOGRAPHY**  
BISON P.(\*), BORTOLIN A.(\*), CADELANO G.(\*), FERRARINI G.(\*), LEI L.(\*\*), MALDAGUE X.(\*\*), ROSSI S.(\*)  
(\* ITC-CNR, Italy, (\*\* ECE Department, Université Laval, Canada)

**16:50 646 THERMAL REGULATING SYSTEM IN TEMPERATURE-CONTROLLED CONTAINERS**  
KACIMI A., LABRANQUE G.  
*SOFRIGAM, France*

**WORKSHOP: MAGNETIC REFRIGERATION: MATERIALS & SYSTEMS FOR COMMERCIALIZATION**

**WS14-Fr-4 Room 304**

Chair: RUSSEK S. L. (*Astronautics Corporation of America, United States*)

**SATURDAY, AUGUST 22**

**8:30-10:10**

**PLATE HEAT EXCHANGER(2) / TWO-PHASE FLOW DISTRIBUTION**

**B1-Sa-1a Room 301**

Chairs: LONGO G. A. (*University of Padova, Italy*)

KARIYA K. (*Saga University, Japan*)

**8:30 74 DEVELOPMENT OF POLYMER PLATE HEAT EXCHANGERS FOR OUTDOORS TELECOM CABINET COOLING SYSTEMS**  
YANG C.-Y., CHIANG L., LIN F.-C.  
*National Central University, Taiwan*

**8:50 356 LAYER ASSIGNMENT AND ARRANGEMENT OPTIMIZATION FOR MULTI-STREAM PLATE-FIN HEAT EXCHANGER DESIGN**  
WANG Z.(\*), LI Y.(\*,\*\*)  
(\* Institute of Refrigeration and Cryogenics, Xi'an Jiaotong University, China, (\*\* State Key Laboratory of Multiphase Flow in Power Engineering, China)

**9:10 933 INVESTIGATION ON THE GAS-LIQUID TWO-PHASE FLOW CHARACTERISTICS OF HEADER DISTRIBUTION TYPE WITH USING THE R134a**  
XIE P.(\*), SATO R.(\*\*), SAKAMOTO N.(\*\*), KATSUTA M.(\*)  
(\* Waseda University, Graduate School of Environment and Energy Engineering, Japan, (\*\* Faculty of Science and Engineering, Waseda University, Japan)

**9:30 478 EXPERIMENTAL STUDY ON GAS-LIQUID FLOW DISTRIBUTIONS IN MULTI-PASS CHANNELS**  
NODA N.(\*), HIROTA M.(\*), TSUCHIYA T.(\*\*), KITAIDE Y.(\*\*), MARUYAMA N.(\*), NISHIMURA A.(\*)  
(\* Department of Mechanical Engineering, Mie University, Japan, (\*\* Fuji Electric Co. Ltd., Japan)

**9:50 840 COMPARATIVE STUDY OF THE USE OF COMPACT HEAT EXCHANGER OR A FIN-AND-TUBE COIL IN A HEAT PUMP**  
GARCÍA-CASCALES J. R., HIDALGO-MOMPEÁN F., RAMÍREZ-BASALO M. A., ILLÁN-GOMÉZ F., VERA-GARCÍA F.  
*Universidad Politécnica de Cartagena, Spain*

**THERMOACOUSTIC REFRIGERATION**

**B1-Sa-1b Room 303**

Chairs: INOUE N. (*Tokyo University of Marine Science and Technology, Japan*)

MOHS W. (*SKOPE Ind Ltd, New Zealand*)

**8:30 528 DESIGN A TWO-STAGE LOOPED-TUBE THERMOACOUSTIC COOLER FOR THERMAL MANAGEMENT OF ENCLOSURES**  
YAHYA S. G., MAO X., JAWORSKI A. J.  
*Faculty of Engineering, University of Leeds, United Kingdom*

**8:50 615 MODELING AND RSM OPTIMIZATION OF STANDING-WAVE THERMOACOUSTIC REFRIGERATOR**  
YANG P., LIU X., LIU Y.  
*Key Laboratory of Thermo-Fluid Science and Engineering of MOE, School of Energy and Power Engineering, Xi'an Jiaotong University, China*

**9:10 522 NUMERICAL SIMULATION OF OSCILLATORY FLOW AND HEAT TRANSFER IN THE HEAT EXCHANGERS OF THERMOACOUSTIC SYSTEMS**  
ILORI O. M., MAO X., JAWORSKI A. J.  
*Faculty of Engineering, University of Leeds, United Kingdom*

**9:30 514 OPTIMAL DESIGN OF A THERMOACOUSTIC SYSTEM COMPRISING OF A STANDING-WAVE ENGINE DRIVING A TRAVELLING-WAVE COOLER**  
SAECHAN P.(\*), MAO X.(\*\*), JAWORSKI A. J.(\*\*)  
(\* Department of Mechanical and Aerospace Engineering, Faculty of Engineering, King Mongkut's University of Technology, Thailand, (\*\* Faculty of Engineering, University of Leeds, United Kingdom)

**9:50 526 CHARACTERIZATION OF INEXPENSIVE STACK MATERIALS FOR USE IN STANDING WAVE THERMOACOUSTIC REFRIGERATORS**  
YAHYA S. G., MAO X., JAWORSKI A. J.  
*Faculty of Engineering, University of Leeds, United Kingdom*

**MISCELLANEOUS(1)**

**B1-Sa-1c Room 304**

Chairs: VACEK V. (*Czech Technical University and Unicorn College in Prague, Czech Republic*)

GASPAR P. O. (*University of Beira Interior, Portugal*)

**8:30 728 FLOW CHARACTERISTICS OF TETRA-N-BUTYL AMMONIUM BROMIDE CLATHRATE HYDRATE SLURRY IN 90° ELBOW PIPE**  
SHI X. J., ZHANG P.  
*Institute of Refrigeration and Cryogenics, MOE Key Laboratory for Power Machinery and Engineering, Shanghai Jiao Tong University, China*

**8:50 292 CO<sub>2</sub> HYDRATE SLURRY PRODUCTION IN A FLUIDIZED BED HEAT EXCHANGER**  
ZHOU H., DE SERA I., INFANTE FERREIRA C.  
*Delft University of Technology, Netherlands*

- 9:10 715 CONVECTIVE HEAT TRANSFER AND PRESSURE DROP OF CO<sub>2</sub> HYDRATE MIXTURE IN BURIED PIPELINES**  
 PRAH B., YUN R.  
*Hanbat National University, South Korea*
- 9:30 378 INFLUENCE OF DIAMETER SIZE OF ALUMINUM FIBER MATERIALS ON HEAT STORAGE AND RELEASE ENHANCEMENT PROPERTIES OF LATENT HEAT STORAGE PARAFFIN WITH ALUMINUM FIBER MATERIALS**  
 HARUKI N., HORIBE A., SANO Y., HACHIYA K.  
*Graduate School of Natural Science and Technology, Okayama University, Japan*
- 9:50 596 HEAT TRANSFER AT SUPERCRITICAL STATE FOR ORGANIC RANKINE APPLICATIONS**  
 LAZOVA M., KAYA A., HUISSEUNE H., DE PAEPE M.  
*Ghent University, Belgium*

### ENERGY EFFICIENCY(3)

#### E2-Sa-1 Room 313+314

Chairs: OHNO K. (*Waseda University, Japan*)

TBD

- 8:30 150 A PRELIMINARY STUDY OF THE PERFORMANCE ENHANCEMENT OF A DUAL-MODE HEAT PUMP USING AN EJECTOR**  
 LIU E.(\*), GROLL E.(\*\*)  
 (\*) *Shanghai University of Electric Power, China*, (\*\*) *School of Mechanical Engineering, Ray W. Herrick Laboratories, Purdue University, United States*
- 8:50 531 DESIGN OF TWO-STAGE THERMOACOUSTIC STIRLING ENGINE COUPLED WITH PUSH-PULL LINEAR ALTERNATOR FOR WASTE HEAT RECOVERY**  
 HAMMOOD A., MAO X., JAWORSKI A. J.  
*Faculty of Engineering, University of Leeds, United Kingdom*
- 9:10 647 THERMALLY DRIVEN HYBRID EJECTOR HEATING AND COOLING TECHNOLOGIES: AN INNOVATIVE SOLUTION BEYOND COMPARISON**  
 BUYADGIE O.(\*,\*\*), BUYADGIE D.(\*\*), DRAKHNIA O.(\*\*)  
 (\*) *V.S. Martynovsky Institute of Refrigeration, Cryogenic Technologies and Eco Energetics/WILSON, Ukraine*, (\*\*) *WILSON/SRTC, Ukraine*
- 9:30 913 STUDIES ON THE PERFORMANCE CHARACTERISTICS OF THE VAPOR INJECTION HEAT PUMP SYSTEM IN ELECTRIC VEHICLE**  
 CHOI Y. U., KIM M. S., KIM M. S.  
*Department of Mechanical Engineering, Seoul National University, South Korea*
- 9:50 201 RESEARCH ON EJECTOR-ABSORPTION AMMONIA-WATER HEAT PUMP CYCLE**  
 LIANG Y., LI S.  
*School of Energy and Environment, Southeast University, China*

### CRYOGENIC SYSTEM

#### A1-Sa-1 Room 411+412

Chairs: DANG H. (*National Laboratory for Infrared Physics, Shanghai Institute of Technical Physics, Chinese Academy of Sciences, China*)

OKAMURA T. (*Tokyo Institute of Technology, Japan*)

- 8:30 288 STATUS OF THE NICA CRYOGENICS AT JINR**  
 EMELIANOV N., AGAPOV N., MITROFANOVA J., NIKIFOROV D., KONSTANTINOV A.  
*JINR, Russia*
- 8:50 248 STATUS AND RECENT DEVELOPMENT OF THE NITROGEN CRYOGENIC SYSTEM FOR THE NICA ACCELERATOR COMPLEX AT JINR**  
 MITROFANOVA I.(\*), AGAPOV N.(\*), EMELIANOV N.(\*), KRAKOVSKY B.(\*\*), POPOV O.(\*\*), UDUT V.(\*\*)  
 (\*) *JINR, Russia*, (\*\*) *JSC "NPO GELIYMASH", Russia*
- 9:10 771 PRESSURE-DROP REDUCTION AND HEAT-TRANSFER DETERIORATION OF SLUSH NITROGEN IN TRIANGULAR PIPE FLOW**  
 OHIRA K.(\*), OKUYAMA J.(\*), TAKAHASHI K.(\*), AOKI I.(\*\*)  
 (\*) *Institute of Fluid Science, Tohoku University, Japan*, (\*\*) *JECC Torisha Co., Ltd., Japan*
- 9:30 620 NUMERICAL STUDY OF THE DYNAMIC PRESSURIZATION IN A CRYOGENIC STORAGE TANK**  
 WU R.(\*), LIU Y.(\*), WANG T.(\*\*), WANG L.(\*\*), YE W.(\*\*), YANG P.(\*)  
 (\*) *Key Laboratory of Thermo-Fluid Science and Engineering of MOE, School of Energy and Power Engineering, Xi'an Jiaotong University, China*, (\*\*) *Key Laboratory of Vacuum Physics and Cryogenic Technology, Lanzhou Institute of Physics, China*

### CRYOBIOLOGY(1)

#### C1-Sa-1 Room 413

Chairs: TBD

WATANABE M. (*Toho University Omori Medical Center, Japan*)

- 8:30 333 INFRARED DIFFERENTIAL THERMAL ANALYSIS (IDTA) OF MULTIPLE FREEZING PROCESSES**  
 ZARAGOTAS D., LIOLIOS N. T., ANASTASSOPOULOS E.  
*TEI of Thessaly, Greece*
- 8:50 372 EFFECTS OF ICE SEEDING TEMPERATURE ON INTRACELLULAR FREEZING OF CELLS**  
 WANG Y., ZHU K.  
*Tianjin Key Laboratory of Refrigeration Technology, Tianjin University of Commerce, China*
- 9:10 375 EVALUATION OF EXTRACELLULAR ICE FORMATION AFFECTING CELLS IN SUSPENDED AND ATTACHED STATE**  
 ZHU K., WANG Y.  
*Tianjin Key Laboratory of Refrigeration Technology, Tianjin University of Commerce, China*

**OTHERS(4)****B2-Sa-1 Room 414+415**Chairs: KATSUTA M. (*Waseda University, Japan*)HIRAO T. (*Mitsubishi Heavy Industries, Ltd., Japan*)

- 8:30 46 EXPERIMENTAL AND NUMERICAL INVESTIGATION ON A NEW TYPE DISTRIBUTOR FOR R410A AIR CONDITIONER**  
ZHANG C., ZHU J., LI Z., NEW M., CHEN J.  
*Institute of Refrigeration and Cryogenics Shanghai Jiaotong University, China*
- 8:50 144 MECHANICAL INTEGRITY FOR PIPING AND VESSELS IN INDUSTRIAL REFRIGERATION SYSTEMS**  
REINDL D., DETTMERS D.  
*University of Wisconsin-Madison, Industrial Refrigeration Consortium, United States*
- 9:10 376 INVESTIGATION ON EFFECTIVE THERMAL CONDUCTIVITY OF MH WITH ALUMINIUM FOAM SHEET AND ITS APPLICATION IN A METAL-HYDROGEN REACTOR**  
LIN K.-T.(\*), YANG Y.(\*), BAE S.-C.(\*\*), KATSUTA M.(\*)  
(\* *Department of Modern Mechanical Engineering, Waseda University, Japan*, (\*\* *Environmental Research Institute, Waseda University, Japan*)
- 9:30 566 INTEGRATION OF A LATENT HEAT STORAGE IN VRF SYSTEMS FOR HEATING AND COOLING WITH ENHANCED FLEXIBILITY AND EFFICIENCY**  
LOISTL F., SCHWEIGLER C.  
*University of Applied Sciences Munich, Cooperative Graduate Center "Building Services Engineering & Energy Efficiency", Germany*

**CYCLE****D1-Sa-1 Room 416+417**Chairs: CLELAND D. (*Massey University, New Zealand*)IWAMOTO Y. (*Doshisha University, Japan*)

- 8:30 360 EFFECT OF FORCED-AIR COOLING, LOW TEMPERATURE STORAGE AND TRANSPORTATION, FOUR RETAILING METHODS ON QUALITY OF PEARS**  
YAN C.(\*\*, \*), LIU S.(\*\*, \*), JIA L.(\*), KAN Z.(\*), WANG D.(\*)  
(\* *Beijing Vegetable Research Center, Beijing Academy of Agriculture and Forestry Sciences, National Engineering Research Center for Vegetables, China*, (\*\* *College of Food Science and Technology, Shanghai Ocean University, China*)
- 8:50 179 CASCADE REFRIGERATION SYSTEM WITH INVERSE BRAYTON CYCLE ON THE COLD SIDE**  
GIANNETTI N.(\*), MILAZZO A.(\*\*), ROCCHETTI A.(\*\*)  
(\* *Waseda University, Department of Applied Mechanics and Aerospace Engineering, Japan*, (\*\* *University of Florence, Department of Industrial Engineering, Italy*)
- 9:10 667 USE OF ZEOTROPIC BLENDS IN FLOODED REFRIGERATION LOOPS : CONSEQUENCES AND LIMITS**  
GUILPART J.  
*IIR, MF Conseil, France*

**OTHERS****D2-Sa-1 Room 418**Chairs: LUKASSE L. (*Wageningen University & Research, Netherlands*)YOSHIDA Y. (*Hitachi Appliances, Inc., Japan*)

- 8:30 688 EXPERIMENTAL INVESTIGATION OF ENERGY BALANCE DURING THE DOOR OPENING OF A REFRIGERATED TRUCK**  
LAFAYE DE MICHEAUX T., SARTRE V., BONJOUR J.  
*CETHIL UMR5008, Université de Lyon, CNRS, INSA-Lyon, University Lyon 1, France*
- 8:50 426 NEW APPROACHES FOR THE ENVIRONMENTAL CONTROL SYSTEM IN AIRCRAFTS WITH THE APPLICATION OF A VAPOR COMPRESSION CYCLE**  
GOLLE S.(\*), HESSE U.(\*), KLIMPEL F.(\*\*)  
(\* *Technische Universität Dresden, Institut für Energietechnik, Bitzer-Stiftungsprofessur für Kälte-, Kryo- und Kompressorentechnik, Germany*, (\*\* *Airbus Operations GmbH, Germany*)
- 9:10 766 DEVELOPMENT OF A NOVEL REFRIGERATED TRANSPORT SYSTEM USING A COMBINATION OF LIQUID NITROGEN EXPANSION AND MECHANICAL VAPOUR COMPRESSION**  
TEYSSANDIER E.(\*), METCALF P.(\*), OWEN N.(\*), LAWTON R.(\*\*), MYNOTT T.(\*\*), L'HEUREUX Z.(\*\*\*)  
(\* *The Dearman Engine co, United Kingdom*, (\*\* *Cambridge Refrigeration Technology, United Kingdom*, (\*\*\*) *Lenfest Center for Sustainable Energy, Earth Institute, Department of Earth and Environmental Engineering, Columbia University, United States*)
- 9:30 533 MEASUREMENT OF TEMPERATURE HOMOGENEITY IN EQUIPMENT FOR PHARMACEUTICALS TRANSPORT UNDER CONTROLLED TEMPERATURE**  
CAVALIER G., BOUDET N., BONED M.  
*Cemafruid, France*

**SATURDAY, AUGUST 22****10:30-11:30****NANOFLUIDS****B1-Sa-2a Room 301**Chairs: ROSSETTO L. (*Department of Ingegneria Industriale, University of Padova, Italy*)JIGE D. (*Tokyo University of Marine Science and Technology, Japan*)

- 10:30 802 EXPERIMENTAL RESEARCH ON VISCOSITY OF AL2O3 - H2O NANOFLUIDS**  
LIU B., MA X., CAI B.  
*Tianjin Key Lab of Refrigeration Technology, Tianjin University of Commerce, China*
- 10:50 217 PREDICTION MODEL OF THE AVERAGE SIZE OF AGGREGATE IN NANOREFRIGERANT**  
LIN L.(\*), PENG H.(\*\*), DING G.(\*)  
(\* *Institute of Refrigeration and Cryogenics, Shanghai Jiao Tong University, Shanghai, China*, (\*\* *Department of Energy and Power Engineering, Beijing University of Civil Engineering and Architecture, China*)

- 11:10 318 AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF THE COMPRESSOR OIL AND NANOPARTICLES ADMIXTURES INFLUENCE ON THE PERFORMANCE OF THE COMPRESSOR SYSTEMS**  
CHEN G.(\*), ZHELEZNY V.(\*\*), SHESTOPALOV K.(\*,\*\*),  
LUKIANOV N.(\*\*), POLYUGANICH M.(\*\*)  
(\* ) Ningbo Institute of Technology, Zhejiang University, China, (\*\*)  
Department of Thermophysics and Applied Ecology, Odessa National Academy of Food Technologies, Ukraine

#### CFD

##### B1-Sa-2b Room 303

Chairs: GARCÍA-CASCALES J. R. (Technical University of Cartagena, Spain)  
HARUKI N. (Okayama University, Japan)

- 10:30 904 SIMULATION OF THE DROPLET PARAMETERS CHANGING ALONG THE FLOW**  
CHANG S.(\*), LENG M.(\*), DANG C.(\*\*), JIN J.(\*)  
(\* ) Beihang University, China, (\*\* ) The University of Tokyo, Japan

- 10:50 176 3D AND TRANSIENT NUMERICAL MODELING OF DOOR OPENING AND CLOSING PROCESSES AND ITS INFLUENCE ON THERMAL PERFORMANCE OF COLD ROOMS**  
CARNEIRO R., GASPAR P. D., SILVA P. D.  
University of Beira Interior, Edifício I das Engenharias Calçada Fonte do Lameiro nº 1, Portugal

- 11:10 523 CFD STUDY OF OSCILLATORY FLOW THROUGH 90° BENDS OF THERMOACOUSTIC DEVICES**  
ILORI O. M., MAO X., JAWORSKI A. J.  
Faculty of Engineering, University of Leeds, United Kingdom

#### MISCELLANEOUS(2)

##### B1-Sa-2c Room 304

Chairs: YUN R. (Hanbat National University, South Korea)  
HIGASHI Y. (Iwaki Meisei University, Japan)

- 10:30 341 THE AIRCOOLER DEVICE – A FLEXIBLE AND MOBILE COOLING SOLUTION FOR LOWER LEVEL HEAT LOADS**  
VACEK V.(\*,\*\*), DOUBEK M.(\*)  
(\* ) Czech Technical University in Prague, Department of Physics, Czech (Republic), (\*\* ) Unicorn College, Czech (Republic)

- 10:50 579 EXPERIMENTAL STUDY OF THE WATER EVAPORATION RATE ON STAINLESS STEEL PLATE IN A WIND TUNNEL**  
LECOQ L.(\*,\*\*), FLICK D.(\*\*,\*\*\*), LAGUERRE O.(\*)  
(\* ) Irstea, UR GPAN, France, (\*\* ) AgroParisTech, UMR1145 Ingénierie Procédés Aliments, France, (\*\*\*) INRA, UMR1145 Ingénierie Procédés Aliments, France

- 11:10 572 SIMPLIFIED HEAT AND MASS TRANSFER MODELING IN A FOOD PROCESSING PLANT**  
LECOQ L.(\*,\*\*,\*\*\*), FLICK D.(\*\*,\*\*\*), DERENS E.(\*), HOANG H. M.(\*), LAGUERRE O.(\*)  
(\* ) Irstea, UR GPAN, France, (\*\* ) AgroParisTech, UMR1145 Ingénierie Procédés Aliments, France, (\*\*\*) INRA, UMR1145 Ingénierie Procédés Aliments, France

#### OTHERS

##### E2-Sa-2 Room 313+314

Chairs: KIMURA T. (Japan Society of Refrigerating and Air Conditioning Engineers, Japan)  
TBD

- 10:30 172 ENERGY PERFORMANCE OF CO<sub>2</sub> HYBRID GROUND-COUPLED HEAT PUMPING SYSTEM FOR HOTEL APPLICATION**  
JIN Z.(\*), EIKEVIK T. M.(\*), NEKSÅ P.(\*\*), HAFNER A.(\*\*), DING G.(\*\*\*)  
(\* ) Norwegian University of Science and Technology, Norway, (\*\* ) SINTEF Energy Research, Norway, (\*\*\*) Shanghai Jiao Tong University, China

- 10:50 4 A HYBRID MODEL FOR DYNAMIC SIMULATION OF AN AIR-COOLED HEAT PUMP SYSTEM COUPLED WITH A PCM STORAGE TANK**  
WU J., COUENNE F., HAMROUN B., GAGNIERE E., JALLUT C.  
Université de Lyon, Université Claude Bernard Lyon 1, Laboratoire d'Automatique et de Génie des Procédés, CNRS/UCBL, UMR 5007, France

- 11:10 323 INTERACTIONS OF GROUND SOURCE HEAT PUMPS WITH NEARBY UNDERGROUND RAILWAY TUNNELS IN AN URBAN ENVIRONMENT**  
REVESZ A.(\*), CHAER I.(\*), THOMPSON J.(\*\*), MAVROULIDOU M.(\*), GUNN M.(\*), MAIDMENT G.(\*)  
(\* ) London South Bank University, United Kingdom, (\*\* ) Parsons Brinckerhoff, United Kingdom

#### PROPERTIES OF MATERIALS AT LOW TEMPERATURES

##### A1-Sa-2 Room 411+412

Chairs: POLONARA F. (Universita Politecnica delle Marche, Italy)  
HSU C. (National Chin-Yi University of Technology, Taiwan)

- 10:30 271 EXPERIMENTAL STUDY ON LIQUID NITROGEN SPRAY IN ATMOSPHERIC ENVIRONMENT**  
XUE R.(\*), LIU X.(\*), CAO F.(\*), HOU Y.(\*,\*\*)  
(\* ) School of Energy and Power Engineering, Xi'an Jiaotong University, China, (\*\* ) State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University, China

- 10:50 405 SUPPRESSION OF FROST FORMATION ON A CRYOGENICALLY COOLED CYLINDER USING AN OBSTACLE**  
SATO S., FUKIBA K., SONOBE N., YOSHIMURA Y.  
Department of Mechanical Engineering, Graduate School of Engineering, Shizuoka University, Japan

#### CRYOBIOLOGY(2)

##### C1-Sa-2 Room 413

Chairs: ANASTASSOPOULOS E. (TEI OF THESSALY, Greece)  
MOTOMURA N. (Toho University Sakura Medical Center, Japan)

- 10:30 614 CRYO-SEM AS A SUITABLE TOOL TO STUDY VITRIFICATION IN CRYOPRESERVED TISSUE**  
SCHNEIDER TEIXEIRA A.(\*,\*\*), MOLINA-GARCIA A. D.(\*)  
(\* ) ICTAN-CSIC, Spain, (\*\* ) CIDCA-CONICET, Fac. Cs. Exactas (UNLP), Argentina

- 10:50 520 LONG-TERM EXPERIENCE WITH OPERATION OF A CRYOBANK BASED ON COMBINATION OF CRYOGENIC AND CLEAN-ROOM TECHNOLOGY**  
MERICKA P.(\*), STRAKOVA H.(\*), STERBA L.(\*), HONEGROVA B.(\*), SCHUSTR P.(\*\*), VINS M.(\*\*), BRANDEJS D.(\*)  
(\* *Tissue Bank University Hospital Hradec Králové, Czech (Republic)*, (\*\*) *Ateko, Ltd. Hradec Králové, Czech (Republic)*)

## OTHERS

### D1-Sa-2 Room 416+417

Chairs: EVANS J. (*London South Bank University, United Kingdom*)  
KAWAMURA K. (*Mayekawa Mfg. Co., Ltd., Japan*)

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- 10:30 215 PREPARATION AND PROPERTIES OF LAURIC ACID-DECANOIC ACID/TETRADECYL ALCOHOL-DEDECANE COMPOSITE AS PCMS FOR THERMAL ENERGY STORAGE**  
XU W.(\*), ZHANG X.(\*), LIU T.(\*), LIANG X.(\*), MUNYAL J. M.(\*\*)  
(\* *Cooling Energy Storage Technology Institute, Shanghai Maritime University, China*, (\*\*) *College of Engineering and Technology, Jomo Kenyatta University of Agriculture and Technology, Kenya*)
- 10:50 343 EXPERIMENT STUDY ON PERFORMANCE OF MULTISTAGE WATER TANKS HEAT STORAGE APPLIED TO SOLAR AIR CONDITIONING**  
JIN S., BU G.  
*College of Energy, Nanjing University of Technology, China*
- 11:10 751 AIR INFILTRATION INTO WALK-IN COLD ROOMS THROUGH DOORS**  
CLELAND D. J., EAST A. R., JEFFERY P. B.  
*Centre for Postharvest & Refrigeration Research, Massey University, New Zealand*

## INSULATION

### D2-Sa-2 Room 418

Chairs: ROSSI S. (*ITC-CNR, Italy*)  
PIAO C. (*DAIKIN US Corporation, United States*)

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- 10:30 575 LOW GWP INSULATION BLOWING AGENTS AND METHODS OF MEASUREMENT OF EFFICIENCY**  
LAWTON R., MYNOTT T., MARSHALL N.  
*Cambridge Refrigeration Technology, United Kingdom*
- 10:50 544 PERFORMANCES OF TRANSPORT REFRIGERATION UNITS AT PARTIAL LOAD; TESTING METHODOLOGY AND COMPARISON WITH PERFORMANCES AT FULL LOAD**  
SUQUET I., CAVALIER G.  
*Cemafrroid, France*
- 11:10 911 REFRIGERATION EQUIPMENT PULL DOWN TESTS: A TOOL FOR ENERGY SAVING**  
DEVIN E.(\*), STUMPF A.(\*\*), CAVALIER G.(\*)  
(\* *Cemafrroid SAS, France*, (\*\*) *Carrier Corporation, Transicold Division, France*)

**SATURDAY, AUGUST 22**

**11:30-12:30**

**Room 301**

**11:30 CLOSING CEREMONY**