



INSTITUT INTERNATIONAL DU FROID
INTERNATIONAL INSTITUTE OF REFRIGERATION

CONFERENCE PROGRAM

6th IIR Conference on Thermophysical Properties and Transfer Processes of Refrigerants

TPTPR2021

Low GWP refrigerants: 10 years after

University of Padova
Vicenza Campus – Italy
1-3 September 2021
www.gest.unipd.it/TPTPR2021



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Programme at a glance

Venue	1st Sept, Wednesday			
Time (CEST)	MAIN ROOM			
09:00 - 10:00	WELCOME			
10:00 - 11:00	KEYNOTE LECTURE 1			
11:00-11:30	Virtual Coffee Break			
	ROOM A	ROOM B	ROOM C	ROOM D
11:30-13:00	TPTPR 1	TPTPR 2	PCM 1	PCM 2
13:00-14:00	LUNCH			
	MAIN ROOM			
14:00-15:00	KEYNOTE LECTURE 2			
15:00-15:30	Virtual Coffee Break			
15:30-17:00	TPTPR 3	TPTPR 4	PCM 3	PCM 4

Venue	2nd Sept, Thursday			
Time (CEST)	MAIN ROOM			
09:00-10:00	KEYNOTE LECTURE 3			
	ROOM A	ROOM B	ROOM C	ROOM D
10:00-11:30	TPTPR 5	TPTPR 6	PCM 5	PCM 6
11:30-12:00	Virtual Coffe Break			
12:00-13:30	TPTPR 7	TPTPR 8	PCM 7	PCM 8
13:30-14:30	LUNCH			
	MAIN ROOM			
14:30-15:30	KEYNOTE LECTURE 4			
15:30-16:00	Virtual Coffe Break			
	ROOM A	ROOM B	ROOM C	ROOM D
16:00-17:30	TPTPR 9	TPTPR 10	PCM 9	PCM 10
17:30-19:00	IIR commissions meeting			

Venue	3rd Sept, Friday			
Time (CEST)	MAIN ROOM			
09:00-10:00	KEYNOTE LECTURE 5			
	ROOM A	ROOM B	ROOM C	ROOM D
10:00-11:30	TPTPR 11	TPTPR 12	PCM 11	PCM 12
11:30-12:00	Virtual Coffe Break			
12:00-13:30	TPTPR 13		PCM 13	
	MAIN ROOM			
13:30-14:30	CLOSING			

Timing is referred to Italian summer time (CET +1 h)

Opening session

Welcome

Time: Wednesday, 01/Sep/2021: 9:00am - 10:00am · *Location:* MAIN ROOM

Keynote 1 (Chair: G. A. Longo)

Time: Wednesday, 01/Sep/2021: 10:00am - 11:00am · *Location:* MAIN ROOM

Some important specificities of the boiling behavior of water used as (the most natural) refrigerant Jocelyn Bonjour

Department of Energy and Environmental Engineering, INSA Lyon

TTPR1: Plate heat exchangers (Chair: C. Kondou)

Time: Wednesday, 01/Sep/2021: 11:30am - 1:00pm · *Location:* ROOM A

11:30am - 11:50am ID: 1962

ANALYSIS OF THE BEHAVIOR OF THE HEAT TRANSFER IN PLATE HEAT EXCHANGER WITH THE AID OF SIMULATION

Thiha Tun^(a), Kunpei Yoshida^(a), Keishi Kariya^(a), Akio Miyara^(a,b)

^(a)Department of Mechanical Engineering, Saga University, Japan, ^(b)International Institute for Carbon-Neutral Energy Research, Kyushu University, Japan

11:50am - 12:10pm ID: 2045

EXPERIMENTAL STUDY ON FLOW BOILING OF R410A AND R32 IN BRAZED PLATE EVAPORATORS WITH DIFFERENT NUMBER OF PLATES

Andrea Padovan^(a), Giuseppe Censi^(a)

^(a)Onda S.p.A, Italy

12:10pm - 12:30pm ID: 1931

EXPERIMENTAL EVALUTATION OF DIFFERENT HEAT EXCHANGER TYPOLOGIES FOR COMBINED THERMAL-ELECTRIC REFRIGERATION PURPOSES

Valeria Palomba^(a), Giuseppe E. Dino^(a), Davide La Rosa^(a), Fabio Costa^(a), Andrea Frazzica^(a)

^(a)National Research Council of Italy – Institute for Advanced Energy Technologies (CNR ITAE), Italy

12:30pm - 12:50pm ID: 1958

EXPERIMENTAL INVESTIGATION ON HEAT TRANSFER OF SUPERCRITICAL CARBON DIOXIDE FLOWING IN A TRI-PARTITE BRAZED PLATE GAS COOLER

Alireza Zendejboudi^(a), Zuliang Ye^(a,b), Armin Hafner^(a)

^(a) Department of Energy and Process Engineering, Norwegian University of Science and Technology Trondheim, 7491, Norway, *alireza.zendejboudi@ntnu.no

^(b) School of Energy and Power Engineering, Xi'an Jiaotong University, Xi'an, 710049, China

TTPR2: Absorption / adsorption processes #1 (Chair: A. Coronas)

Time: Wednesday, 01/Sep/2021: 11:30am - 1:00pm · *Location:* ROOM B

11:30am - 11:50am ID: 1941

CFD INVESTIGATION OF THE WETTING CHARACTERISTICS OF AQUEOUS IONIC LIQUID SOLUTION ON AN ALUMINUM FIN-TUBE SUBSTRATE

Richard Jayson Varela^(a), Hifni M. Ariyadi^(b), Niccolò Giannetti^(c), Jongsoo Jeong^(d), Kiyoshi Saito^(a)

^(a)Department of Applied Mechanics and Aerospace Engineering, Waseda University, Japan, ^(b)Department of Mechanical and Industrial Engineering, Universitas Gadjah Mada, Indonesia, ^(c)Waseda Institute for Advanced Study, Waseda University, Japan, ^(d)Research Institute for Science and Engineering, Waseda University, Japan

11:50am - 12:10pm ID: 2059

DETERMINATION IN-SITU OF THE IONIC LIQUID/H₂O MIXTURE COMPOSITION BY NEAR-INFRARED SPECTROSCOPY TO STUDY THE ABSORPTION PROCESS OF WATER INTO THE SOLUTION

María Soledad Larrechi^(a,b), Daniel Salavera^(b), Juan Prieto^(b), Alberto Coronas^(b)

^(a)Universitat Rovira i Virgili, Analytical and Organic Chemistry Department, Spain, ^(b)Universitat Rovira i Virgili, Mechanical Engineering Department, CREVER, Spain

12:10pm - 12:30pm ID: 1912

CO₂ HYDRATE FORMATION AND COLD THERMAL ENERGY TRANSPORTATION EVALUATION

Joon Ho Park^(a), Jungjoon Park^(a), Yong Tae Kang^(b)

^(a)Department of Mechanical Engineering, Korea University, Republic of Korea, ^(b)School of Mechanical Engineering, Korea University, Republic of Korea

Keynote 2 (Chair: **S. Mancin**)

Time: Wednesday, 01/Sep/2021: 2:30pm - 3:30pm · *Location:* MAIN ROOM

State of art of PCM for air conditioning and refrigeration

Luisa F. Cabeza

University of Lleida, Spain

TTPR3: Natural refrigerants (Chair: **A. Hafner**)

Time: Wednesday, 01/Sep/2021: 3:30pm - 5:00pm · *Location:* ROOM A

3:30pm - 3:50pm ID: 1944

PROPANE AS A POSSIBLE SUBSTITUTE OF R134A FOR USE IN AN ALL-IN-ONE HEAT PUMP FOR DHW

Michele Giacomelli^(a), Andrea Rizzo^(a), Luca Molinaroli^(b)

^(a)Advantix Spa, Italy, ^(b)Dipartimento di Energia, Politecnico di Milano, Italy

3:50pm - 4:10pm ID: 2181

CFD ANALYSIS OF PROPANE DISPERSION IN AN INDOOR ENVIRONMENT

Giulia Righetti^(a), Michele Calati^(a), Giovanni A. Longo^(a), Simone Mancin^(a), Claudio Zilio^(a)

^(a)University of Padova, Dep. of Management and Engineering, Vicenza, Italy

4:10pm - 4:30pm ID: 2193

LIFE CYCLE ASSESSMENT OF A NEAR-TO-ZERO GWP AIR CONDITIONER

Nicola Moro^(a), Ugo Pretato^(a), Elia Rillo^(a), Irene Cropanise^(a), Giulia Zarroli^(a)

^(a)Studio Fieschi & soci Srl, Torino, Italy

4:30pm - 4:50pm ID: 2046

NUMERICAL ANALYSIS OF THE THERMAL PERFORMANCE OF A CO₂ REFRIGERATING UNIT FOR MULTI-TEMPERATURE TRANSPORT APPLICATIONS

Francesco Fabris^(a), Paolo Artuso^(b), Sergio Marinetti^(b), Silvia Minetto^(b), Antonio Rossetti^(b)

^(a)Industrial Engineering Department, University of Padua, Italy. ^(b)National Research Council, Construction Technologies Institute (CNR-ITC), Italy

TTPR4: Absorption / adsorption processes #2 (Chair: **Y. Hwang**)

Time: Wednesday, 01/Sep/2021: 3:30pm - 5:00pm · *Location:* ROOM B

3:30pm - 3:50pm ID: 1936

ON THE EVALUATION OF HEAT AND MASS TRANSFER CAPABILITIES OF DIFFERENT WORKING MEDIA IN ABSORPTION HEAT PUMPING DEVICES

Roland Kühn^(a), Thomas Meyer^(a), Felix Ziegler^(a)

^(a)Chair for Energy Conversion Technology, Technische Universität Berlin, Germany

3:50pm - 4:10pm ID: 2057

MODELLING OF THERMODYNAMIC PROPERTIES OF THE CO₂/ACETONE MIXTURE IN A WIDE RANGE OF TEMPERATURE AND PRESSURE FOR RESORPTION REFRIGERATION SYSTEMS

Gisselle E. Ramírez-Ramos^(a), Daniel Salavera^(a), Yohann Coulier^(b), Karine Ballerat-Busserolles^(b), Alberto Coronas^(a)

^(a)Universitat Rovira i Virgili, Dep. Ingeniería Mecánica, CREVER, Spain, ^(b)Université Clermont Auvergne, CNRS, SIGMA Clermont, Institut de Chimie de Clermont-Ferrand, France

4:10pm - 4:30pm ID: 2058

VISCOSITY AND MASS DIFFUSION COEFFICIENT OF AMMONIA/ETHYLAMMONIUM NITRATE MIXTURES

Ronny Rives^(a), Daniel Salavera^(a), Alberto Coronas^(a)

^(a)Universitat Rovira i Virgili, Mechanical Engineering Department, CREVER-Research Group, Spain

Keynote 3 (Chair: S. Bobbo)

Time: Thursday, 02/Sep/2021: 9:00am - 10:00am · *Location:* MAIN ROOM

Thermodynamic property measurements for next-generation refrigerants

Yukihiro Higashi

Research Center for Next Generation Refrigerant Properties (NEXT-RP)

International Institute for Carbon-Neutral Energy Research (I 2 CNER), Kyushu University, Japan

TTPR5: Two-phase flow and distribution issues (Chair: Y.T. Kang)

Time: Thursday, 02/Sep/2021: 10:00am - 11:30am · *Location:* ROOM A

10:00am - 10:20am ID: 1864

VISUALIZATION OF NON-EQUILIBRIUM TWO-PHASE FLOW

Mehdi Rasti^(a), Ji H. Jeong^(a)

^(a) School of Mechanical Engineering, Pusan National University, Busan 46241, Korea

10:20am - 10:40am ID: 1911

NON-EQUILIBRIUM FORMULATION OF VOID FRACTION IN TWO-PHASE FLOWS

Niccolò Giannetti^(a), Moojoong Kim^(b), Hiroaki Yoshimura^(c), Kiyoshi Saito^(c)

^(a) Waseda Institute for Advanced Study, Waseda University 1-6-1 Nishiwaseda, Shinjuku-ku, Tokyo 169-8050, Japan, ^(b)

Research institute for science and engineering, Waseda University, Shinjuku-ku, Tokyo, 169-8555, Japan, ^(c)

Department of Applied Mechanics and Aerospace Engineering, Waseda University 3-4-1 Okubo, Shinjuku-ku, Tokyo, 169-8555, Japan

10:40am - 11:00am ID: 1963

MODELING FLOW DISTRIBUTION IN MULTI-BRANCH CHANNELS USING THE SECOND LAW OF THERMODYNAMICS

Mark Anthony Redo^(a), Niccolò Giannetti^(b), Hiroaki Yoshimura^(c),

Kiyoshi Saito^(c), Manabu Watanabe^(a)

^(a) Department of Food Science and Technology, Tokyo University of Marine Science and Technology, Minato-ku, 108-

8477, Japan, ^(b) Waseda Institute for Advanced Study, Waseda University 1-6-1 Nishiwaseda, Shinjuku-ku, Tokyo 169-

8050, Japan, ^(c) Department of Applied Mechanics and Aerospace Engineering, Waseda University, 3-4-1 Okubo,

Shinjuku-ku, Tokyo 169-8555, Japan

TTPR6: The energy flexibility of enhanced heat pumps for the next generation of sustainable buildings #1 (Chair: C. Zilio)

Time: Thursday, 02/Sep/2021: 10:00am - 11:30am · *Location:* ROOM B

10:00am - 10:20am ID: 2141

THE ROLE OF HEAT PUMPS IN ENERGY COMMUNITIES: POTENTIAL AND LIMITS

Nicola Franzoi^(a), Alessandro Prada^(a), Paolo Baggio^(a)

^(a) University of Trento, Trento, 38123, Italy

10:20am - 10:40am ID: 1920

NUMERICAL MODELLING AND SEASONAL PERFORMANCE ANALYSIS OF AIR-TO-WATER HEAT PUMPS USING LOW-GWP REFRIGERANT R-454B AS AN ALTERNATIVE TO R-410A

Matteo Dongellini^(a), Claudia Naldi^(a), Raffaele Siani^(a), Gian Luca Morini^(a)

^(a) Department of Industrial Engineering, Alma Mater Studiorum – University of Bologna, Bologna, 40136, Italy

10:40am - 11:00am ID: 1990

EXPERIMENTAL MEASUREMENT OF CYCLIC DEGRADATION PERFORMANCE OF AIR CONDITIONERS THROUGH A BUILDING LOAD SIMULATION IN A TEST CHAMBER ENVIRONMENT

Myung-Sup Yoon^(a), Won-Sik Yoon^(a)

^(a) Korea Testing Laboratory Seoul, 08389, Korea

11:00am - 11:20am ID: 1972

ON THE USE OF THERMAL STORAGES IN LOW-CAPACITY HEAT PUMP SYSTEMS

Alessandro Franco^(a), Daniele Testi^(a), Carlo Bartoli^(a), Paolo Conti^(a)

^(a) University of Pisa, Department of Energy, Systems, Territory and Constructions Engineering Pisa, 56122, Italy

TPTPR7: Boiling and condensation of refrigerants (Chair: **A. Miyara**)

Time: Thursday, 02/Sep/2021: 12:00pm - 1:40pm · *Location:* ROOM A

12:00pm - 12:20pm ID: 2060

EXPERIMENTAL EVALUATION OF FLOW BOILING HEAT TRANSFER COEFFICIENT OF LOW-GWP NON-AZEOTROPIC MIXTURE R454C IN A 6.0 MM STAINLESS-STEEL HORIZONTAL TUBE

Rita Mastrullo^(a), Alfonso William Mauro^(a), Giovanni Napoli^(a,b), Luca Viscito^(a)

^(a) Department of Industrial Engineering, Università degli Studi di Napoli – Federico II, P.le Tecchio 80, 80125 Naples, Italy ^(b) Dipartimento di Ingegneria Gestionale, dell'Informazione e della Produzione, Università degli Studi di Bergamo, Viale Marconi 5, Dalmine, BG 24044, Italy

12:20pm - 12:40pm ID: 2000

INFLUENCE OF CIRCUIT ARRANGEMENT ON EVAPORATOR PERFORMANCE USING THE HYBRID METHOD

Giuseppe Starace^(a), Silvia Macchitella^(b), Maria Fiorentino^(b), Gianpiero Colangelo^(b)

^(a) LUM University – Department of Management, Finance and Technology Casamassima (BA), 70010, Italy,

^(b) University of Salento - Department of Engineering for Innovation
Lecce, 73100, Italy

12:40pm - 1:00pm ID: 2047

EXPERIMENTAL AND CALCULATED HEAT TRANSFER OF A MICRO-FIN SHELL-AND-TUBE EVAPORATOR: R513A AS DROP-IN REPLACEMENT FOR R134A

Giuseppe Censi^(a), Andrea Padovan^(a)

^(a) Onda S.p.A. Lonigo, I-36045, Italy

1:00pm - 1:20pm ID: 2037

OPTICAL MEASUREMENTS OF LIQUID FILM AND WAVES DURING ANNULAR-FLOW CONDENSATION INSIDE A CHANNEL

Arianna Berto^(a), Marco Azzolin^(a), Stefano Bortolin^(a), Pascal Lavieille^(b), Marc Miscevic^(b), Davide Del Col^(a)

^(a) Department of Industrial Engineering, University of Padova Via Venezia 1, 35131 - Padova, Italy, ^(b) Université Toulouse III - Paul Sabatier, Laboratoire Plasma et Conversion d'Énergie – LAPLACE118 Route de Narbonne, 31062 - Toulouse, France

1:20pm - 1:40pm ID: 2040

ENTROPIC AND STATISTICAL ANALYSIS OF REFRIGERATION CYCLE TAKING INTO ACCOUNT REFRIGERANT PRESSURE DROP IN CONDENSER

Maxim Talyzin^(a), Varvara Tsepova^(b), Anastasiya Balan^(b)

^(a) International Academy of Refrigeration Moscow, 105005, Russian Federation, ^(b) Bauman Moscow State Technical University, Moscow, 105005 Russian Federation

TTPR8: The energy flexibility of enhanced heat pumps for the next generation of sustainable buildings #2 (Chair: D. Testi)

Time: Thursday, 02/Sep/2021: 12:00pm - 1:30pm · *Location:* ROOM B

12:00pm - 12:20pm ID: 1979

IMPLEMENTATION OF DIFFERENT CONTROL STRATEGIES OF HEAT PUMP COUPLED WITH THERMAL AND ELECTRICAL STORAGES FOR A NON-RESIDENTIAL nZEB

Francesco Isaia^(a), Davide Fop^(a), Alfonso Capozzoli^(a), Valentina Serra^(a), Marco Perino^(a)

^(a) Politecnico di Torino, Torino, 10129, Italy

12:20pm - 12:40pm ID: 2061

USE OF ARTIFICIAL INTELLIGENCE IN THE REFRIGERATION FIELD

Biagio Citarella^(a), Alfonso William Mauro^(a), Francesco Pelella^(a)

^(a)Department of Industrial Engineering, Università degli studi di Napoli – Federico II, P.le Tecchio 80, 80125 Naples, Italy

12:40pm - 1:00pm ID: 2038

ICE THERMAL ENERGY STORAGE FOR ELECTRICITY PEAK SHAVING IN A COMMERCIAL REFRIGERATION/HVAC UNIT

Paola D'Agaro^(a), Michele Libralato^(a), Gabriele Toffoletti^(a), Giovanni Cortella^(a)

^(a)DPIA, Università degli Studi di Udine, Udine, 33100, Italy

1:00pm - 1:20pm ID: 2206

THEORETICAL STUDY OF A MULTILEVEL HEAT PUMP FOR MULTI-SOURCE HEATING

Bassam E. Badran^(a), Adrián Mota-Babiloni^(b), Morteza Ghanbarpour^(a), Rahmatollah Khodabandeh^(a)

^(a) Division of Applied Thermodynamics and Refrigeration, KTH Royal Institute of Technology Stockholm, 114 28, Sweden ^(b) Department of Mechanical Engineering and Construction, Universitat Jaume I Castelló de la Plana, 12071, Spain

1:20pm - 1:40pm ID: 2205

CRITICAL VAPOUR QUALITY MEASUREMENT DURING R1233zd(E) FLOW BOILING IN A MICROFIN TUBE

Giovanni Antonio LONGO^(a), Simone MANCIN^(a), Giulia RIGHETTI^(a), Claudio ZILIO^(a), Luca DORETTI^(b)

^(a) Dept. of Management and Engineering, University of Padova, Vicenza, 36100, Italy,

^(b) Dept. of Civil, Architectural and Environmental Engineering, University of Padova, Padova, 35131, Italy

Keynote 4 (Chair: C. Zilio)

Time: Thursday, 02/Sep/2021: 2:30pm - 3:30pm · *Location:* MAIN ROOM

Some issues in heat transfer needed to be clarified for a better design of heat exchangers in refrigeration (a/c and heat pump) systems

Pedrag S. Hrnjak

University of Illinois at Urbana Champaign, USA

TTPR9: Low GWP synthetic refrigerants applications (Chair: X. Li)

Time: Thursday, 02/Sep/2021: 4:00pm - 5:30pm · *Location:* ROOM A

4:00pm - 4:20pm ID: 1992

EXPERIMENTAL INVESTIGATION OF A ROLLING PISTON COMPRESSOR OPERATED WITH A ZEOTROPIC REFRIGERANT MIXTURE

Melanie Cop^(a), Christiane Thomas^(a), Ullrich Hesse^(a)

^(a) Technische Universität Dresden, Bitzer Chair of Refrigeration, Cryogenics and Compressor Technology, 01062 Dresden, Germany

4:20pm - 4:40pm ID: 2090

THEORETICAL STUDY USING LOW GWP BLENDS IN VARIOUS REFRIGERANT SUBCOOLING DESIGNS SUITABLE FOR COMMERCIAL REFRIGERATION SYSTEMS

Samer Saab^(a), Neil A. Roberts^(b), Chris Parker^(c)

^(a) Chemours France S.A.S. Rieux, 60871, France, ^(b) Chemours U.K. Ltd Manchester, M1 5ES, United Kingdom, ^(c) Wheatlands Aire Valley Engineering Ltd Keighly, BD20 7RH, United Kingdom

4:40pm – 5:00pm ID: 1989

R-449A CONFIGURATIONS FOR ENERGY EFFICIENCY IMPROVEMENT OF AN R-404A COMMERCIAL REFRIGERATION SYSTEM

Adrián Mota-Babiloni^(a), Pau Giménez-Prades^(a), Adrián Fernández-Moreno^(a), Pavel Makhnatch^(b), Joaquín Navarro-Esbrí^(a)

^(a) ISTENER Research Group, Department of Mechanical Engineering and Construction, Universitat Jaume I Castelló de la Plana, E-12071, Spain, ^(b) PAMATEK AB Solna, 170 65, Sweden

5:00pm – 5:20pm ID: 2104

INFLUENCE OF THE EVAPORATING TEMPERATURE ON LOWER GWP REFRIGERANTS USED IN A COMPOUND WASTE HEAT-SOLAR DRIVEN EJECTOR-COMPRESSION HEAT PUMP

Ali Khalid Shaker Al-Sayyab^(a,b), Adrián Mota-Babiloni^(a), Adrián Fernández-Moreno^(a), Pau Giménez-Prades^(a), Joaquín Navarro-Esbrí^(a)

^(a) ISTENER Research Group, Department of Mechanical Engineering and Construction, Universitat Jaume I, Campus de Riu Sec s/n, 12071 Castelló de la Plana, Spain, ^(b) Basra Engineering Technical College (BETC), Southern Technical University, Basra, Iraq

TPTPR10: Refrigerant charge and systems efficiency (Chair: R. Radermacher)

Time: Thursday, 02/Sep/2021: 4:00pm - 5:30pm · *Location:* ROOM B

4:00pm - 4:20pm ID: 1923

COMPARISON OF REFRIGERANT CHARGE REQUIREMENTS IN OPTIMIZED FIN AND TUBE EVAPORATOR VERSUS A PLATE HEAT EXCHANGERS

Ehsan Allymeh^(a), Torsten Will^(c), Lena Schnabel^(c), Geir Skaugen^(b)

^(a) Norwegian University of Science and Technology, Kolbjørn Hejes vei 1B, 7030, Trondheim, Norway, ^(b) SINTEF Energy, Kolbjørn Hejes vei 1B, 7030, Trondheim, Norway, ^(c) Fraunhofer-Institute for Solar Energy Systems, Fraunhofer-Institute for Solar Energy Systems, Heidenhofstr. 2, 79110 Freiburg, Germany

4:20pm - 4:40pm ID: 1969

SIMULATION OF THE EFFECTS OF COPPER TUBE DIAMETER ON REFRIGERANT CHARGE REDUCTION IN SPLIT AC SYSTEMS AND REFRIGERATED CABINETS

Yoram Shabtay^(a), Frank Gao^(b), Kerry Song^(b)

^(a)Heat Transfer Technologies, LLC Prospect Heights, Illinois 60070-1063, USA, ^(b) International Copper Association Shanghai, 200020, China

4:40pm – 5:00pm ID: 2062

EFFECT OF REFRIGERANT LEAKAGES ON ENERGY CONSUMPTION OF AN EHP FOR DOMESTIC AIR-CONDITIONING

Alfonso William Mauro^(a), Giovanni Napoli^(a,b), Francesco Pelella^(a)

^(a) Department of Industrial Engineering, Università degli studi di Napoli – Federico II, P.le Tecchio 80, 80125 Naples, Italy, ^(b)Dipartimento di Ingegneria Gestionale, dell'Informazione e della Produzione, Università degli Studi di Bergamo, Viale Marconi 5, Dalmine, BG 24044, Italy

Keynote 5 (Chair: L. Doretti)

Time: Friday, 03/Sept/2021: 9:00am - 10:00am · *Location:* MAIN ROOM

Heating and Cooling Decarbonisation using Phase Change Materials (PCMs) based Technologies

Yulong Ding
University of Birmingham, UK

TTPR11: Measurements and modeling of thermophysical and transport properties #1 (Chair: **S. Bobbo**)

Time: Friday, 03/Sep/2021: 10:00am - 11:30am · *Location:* ROOM A

10:00am - 10:20am ID: 1985

AN UPDATE ON THE THERMOPHYSICAL PROPERTIES DATA AVAILABLE FOR PURE LOW GWP REFRIGERANTS

Laura Fedele^(a), Sergio Bobbo^(a), Davide Menegazzo^(a,b)

^(a) Istituto per le Tecnologie della Costruzione, Consiglio Nazionale delle Ricerche

Padova, I-35127, Italy, ^(b) Università di Padova, Dipartimento di Ingegneria industriale Padova, I-35131, Italy

10:20am - 10:40am ID: 1966

THERMODYNAMIC PROPERTIES MEASUREMENT OF BINARY HFC32 + CF3I REFRIGERANT MIXTURES

Naoya Sakoda^(a), Yukihiro Higashi^(b)

^(a) Department of Mechanical Engineering, Kyushu University Fukuoka, 819-0395, Japan, ^(b) Research Center for Next Generation Refrigerant Properties (NEXT-RP), International Institute for Carbon-Neutral Energy Research (I2CNER), Kyushu University Fukuoka, 819-0395, Japan

10:40am - 11:00am ID: 2006

A NEW FUNDAMENTAL EQUATION OF STATE FOR R1123 AND ITS APPLICATIONS TO MIXTURE MODELS FOR MIXTURES WITH R32 AND R1234yf

Ryo Akasaka^(a,b), Eric W. Lemmon^(c)

^(a) Department of Mechanical Engineering, Faculty of Science and Engineering, Kyushu Sangyo

University, 2-3-1 Matsukadai, Higashi-ku, Fukuoka 8138503, Japan, ^(b) Research Center for Next Generation Refrigerant Properties, International Institute for Carbon-Neutral Energy Research (I2CNER), Kyushu University, 744 Motoooka, Nishi-ku, Fukuoka, 8190395, Japan ^(c) Applied Chemicals and Materials Division, National Institute of Standards and Technology, 325 Broadway, Boulder, Colorado, 80305, USA

11:00am - 11:20am ID: 2016

SURFACE TENSION MEASUREMENT OF REFRIGERANT MIXTURES R448A AND R455A BY A DIFFERENTIAL CAPILLARY RISE METHOD

Yufei Liu^(a), Chieko Kondou^(a)

^(a) Graduate School of Engineering, Nagasaki University Nagasaki, 852-8521, Japan

TTPR12: Enhanced heat transfer (Chair: **A. W. Mauro**)

Time: Friday, 03/Sep/2021: 10:00am - 11:30am · *Location:* ROOM B

10:00am - 10:20am ID: 1866

LOW GWP FLUIDS FOR REPLACING R134a IN AN AIR-CONDITIONING SYSTEM

Houpei Li^(a,b), Jinqing Peng^(a,b)

^(a) College of Civil Engineering Changsha, 410082, China, ^(b) Key Laboratory of Building Safety and Energy Efficiency (Hunan University) Ministry of Education, China

10:20am - 10:40am ID: 1901

A SIMULATION ON MICROCHANNEL HEAT EXCHANGER FOR SYSTEM PERFORMANCE

Houpei Li^(a,b), Jinqing Peng^(a,b)

^(a) College of Civil Engineering Changsha, 410082, China, ^(b) Key Laboratory of Building Safety and Energy Efficiency (Hunan University) Ministry of Education, China

10:40am - 11:00am ID: 1959

UNSTEADY EVAPORATION OF WATER FROM WIRE MESH STRUCTURES AT SUB-ATMOSPHERIC PRESSURES

Rahel Volmer^(a), Lena Schnabel^(a)

^(a) Fraunhofer Institute for Solar Energy Systems ISE

11:00am - 11:20am ID: 1965

A COMPUTATIONAL APPROACH TO DESIGN AND INVESTIGATION OF FINLESS ZIGZAG SHAPED TUBES HEAT EXCHANGER

Sabit Rayhan^(a), **Keishi Kariya**^(a), **Akio Miyara**^(a,b)

^(a) Department of Mechanical Engineering, Saga University

TTPR13: Measurements and modeling of thermophysical and transport properties #2 (Chair: **R. Akasaka**)

Time: Friday, 03/Sep/2021: 12:00pm - 1:30pm · *Location:* ROOM A

12:00pm - 12:20pm ID: 1917

EXPERIMENTAL INVESTIGATION OF THERMOPHYSICAL PROPERTIES OF LUBRICANT REFRIGERANT MIXTURES

Katharina Stoeckel^(a), **Ramona Nosbers**^(a), **Riley B. Barta**^(a), **Christiane Thomas**^(a), **Ullrich Hesse**^(a)

^(a) TU Dresden Bitzer-Professur für Kälte-, Kryo- und Kompressorentchnik, Dresden, 01062, Deutschland

12:20pm - 12:40pm ID: 1867

NEW PACKAGE FOR GENERATING REFRIGERANT EQUATIONS

Morten J. Skovrup^(a), **Jorrit Wronski**^(b), **Ferdinand Breithuth**^(c), **Mattia Sarati**^(d), **Heiko Arnemann**^(e), **Maxime Metral**^(f), **Marek Zgliczynski**^(g), **Oliver Friess**^(h)

^(a) Danfoss A/S, Kolding, 6000, Denmark, ^(b) IPU, Kgs. Lyngby, 2800, Denmark, ^(c) BITZER, Sindelfingen, 71065, Germany, ^(d) Frascold S.p.A., Rescaldina, 20027, Italy, ^(e) Emerson Climate Technologies GmbH, Welkenraedt, 4840, Belgium, ^(f) Tecumseh, Vaulx Milieu, 38090, France, ^(g) Embraco NA, Duluth, 30097, USA, ^(h) GEA Bock GmbH, Frickenhausen, 72636, Germany

12:40pm - 1:00pm ID: 1954

TEMPERATURE-DEPENDENT AND PRESSURE-DEPENDENT CORRELATIONS FOR LIQUID DYNAMIC VISCOSITY OF LOW-GWP REFRIGERANTS

Giovanni Di Nicola^(a), **Sebastiano Tomassetti**^(a), **Mariano Pierantozzi**^(a), **Pio Francesco Muciaccia**^(a)

^(a) Department of Industrial Engineering and Mathematical Sciences, Polytechnic University of Marche, Ancona, 60131 Italy

1:00pm - 1:20pm ID: 2148

DEVELOPMENT OF THERMOPHYSICAL PROPERTY MODELS FOR REFRIGERANT MIXTURES CONTAINING R-1132a

Robert Low^(a)

^(a) Koura Global, Runcorn, United Kingdom

Closing session

Time: Friday, 03/Sep/2021: 1:30pm - 2:30pm · *Location:* MAIN ROOM