PROGRAM

Sunday, June 5, 2022

15:00 - 17:00 Registration (tea and coffee available)

17:00 - 17:30 Welcome and Opening Address

SESSION 1: INTRODUCTION
Chair: Dr. Hans Zettler

17:30 - 18:00 **Talk by Prof. Luis Melo**
LEPABE-Laboratory for Process Engineering, Environment, Biotechnology and Energy, Department of Chemical Engineering, Faculty of Engineering, University of Porto, Porto, Portugal

18:00 - 18:30 **Crude oil fouling – field experience**
Himanshu Joshi
ALPH Heat Transfer, 398 North Rd., Chester NJ 07930 USA

18:30 - 19:00 **Generation of experimental data for model training to optimize fouling prediction**
N. Jarmatz, W. Augustin and S. Scholl
Technische Universität Braunschweig, Institute for Chemical and Thermal Process Engineering, Langer Kamp 7, 38106 Braunschweig, Germany

19:30 - 20:30 Dinner (followed by Social Hour)

Monday, June 6, 2022

7:00 - 9:00 Breakfast

SESSION 2: FOULING IN HYDROCARBON SYSTEMS (PART 1)
Chair: Dr.-Ing. Les Jackowski

9:00 - 9:30 **Economic and environmental implications of fouling in crude preheat trains**
E. M. Ishiyama, S. J. Pugh and H. U. Zettler
HTRI, 40 Occam Road, Guildford, Surrey, GU2 7YG

9:30 - 10:00 **Impact of fouling on thermo-hydraulics of viscous coolers**
E. M. Ishiyama[1] and D. I. Wilson[2]
[1]HTRI, 40 Occam Road, Guildford, Surrey, GU2 7YG
[2]Department of Chemical Engineering and Biotechnology, University of Cambridge, Cambridge, CB3 0AS, UK

10:00 - 10:30 **Ethylene plant cracked gas compressor fouling mitigation**
Bhaskar Reddy Aluri
SABIC Technology Centre, Jubail 31961, Saudi Arabia

10:30 - 11:00 Break

SESSION 3: FOULING IN HYDROCARBON SYSTEMS (PART 2)
Chair: Dr. Aaron Smith

11:00 - 11:30 **Comparison of heat exchanger fouling test results for once-through and recirculating modes of operation at constant flowrate**
F. Cibotti, E. Rogel, E. Forbes and L. Jackowski
Chevron Technical Center, Richmond, CA, USA

11:30 - 12:00 **Characterizing fouling tendency of crude oil on a surface using a High Temperature Variable Shear coupon test rig**
P. Singh[1], S. Krishnaswamy[1], K. Ponnani[2], A. Verma[3] and J. Rawat3
[1]Centre of Excellence in Process Engineering & Intensification (COE-PE&I), Department of Chemical Engineering, BITS-Pilani K K Birla Goa Campus, Goa, India
[2]15/151 (old 7/383) Sreenivas, Sivan Kovil Street, Tharakkad, Palakkad, Kerala-678001, India
[3]Bharat Petroleum Corporation Limited, Corporate R & D Center, Greater Noida, India

12:00 - 12:30 **Incorporation of fouling deposit measurements in crude oil fouling testing and data analysis**
A. Smith and E. Hitimana
HTRI, P.O. Box 1390, Navasota, Texas 77868, USA

12:00 - 13:00 **Enhancement of refinery profitability via increasing the life-cycle of welded plate heat exchanger in the sour water stripping Process**
Ali Bani Kananeh[1], Bennat Drazner[2], Arne Hannig[1], Grant Firth[3] and Rosa Gilsanz[4]
[1] Kelvion PHE, Karl-Schiller-Str. 1-3, D-31157 Sarstedt, Germany, ali.bani-kananeh@kelvion.com
[2] Kelvion Inc - Thermal Engineered Solutions, 5202 West Channel Road, Catoosa, OK 74015, USA
[3]Firth Engineering, Moststr. 10, D-93326 Abensberg, Germany
[4] BAYERNOIL Raffineriegesellschaft GmbH, Raffineriestraße 100, D-93333 Neustadt, Germany

13:00 - 14:00 Lunch

14:00 - 14:30 **Determining the fouling tendency of different feedstocks in the Fouling Assessment Setup (FAST)**
L. dos S. Vargette, N. Ristic, M. Geerts, G.J. Heynderickx and K.M. Van Geem
Laboratory for Chemical Technology, Technologiepark 121, 9052 Zwijnaarde, Belgium

SESSION 4: POSTER SESSION
Chair: Prof. Luis Melo
14:30 - 17:00 Poster session

Tuesday, June 7, 2022

7:00 - 9:00 Breakfast

SESSION 5: FOULING IN FOOD PROCESSING
Chair: Guillaume Delaplace

9:00 - 9:30 **Diffusive mass transfer in cleaning of a jellylike whey protein fouling layer**
H. Wiese, H. Geißler, W. Augustin and S. Scholl
Technische Universität Braunschweig, Institute for Chemical and Thermal Process Engineering, Langer Kamp 7, 38106 Braunschweig, Germany

9:30 - 10:00 **Ultrasonic coda wave interferometry (CWI) for detecting a change at interface of a solid surface - Applications for monitoring fouling, biofilm growth, cleaning and corrosion**
G. Delaplace[1], P. Campistron[2], M. Abdallah[1], A. Boutignon[1], T. Danel[1], S. Khelissa[1], T. Six1, L. Wauquier[1], T. Dubois1, N-E. Chihib[1], P. Debreyne[1], C. Nicard[1], I. Proriol Serre[1], D. Balloy, B. Chen[1,2], M. Farin[2], O. Brehault[2], D. Callens[2], L. Chehami[2], F. Benmeddour[2] and E. Moulin[2]
[1]Univ. Lille, CNRS, INRAE, Centrale Lille, UMR 8207—UMET—Unité Matériaux Et Transformations, France
[2]Univ. Lille, CNRS, Centrale Lille, Junia, Univ. Polytechnique Hauts-de-France, UMR 8520 - IEMN - Institut d'Electronique de Microélectronique et de Nanotechnologie, France

10:00 - 10:30 **Influence of the rheological properties and pull-off forces of native and modified starches on cleaning in plane channel flow**
S. Kricke[1]*, C. Berger[2], S. Zahn[2], H. Köhler[1], H. Rohm[2] and J.-P. Majschak[1]
[1]Chair of Processing Machines/Processing Technology, Institute of Natural Materials Technology, Technische Universität Dresden, Germany
[2]Chair of Food Engineering, Institute of Natural Materials Technology, Technische Universität Dresden, Germany

10:30 - 11:00 Break

11:00 - 11:30 **Role of casein micelle on the whey protein fouling in a bench-scale fouling device**
W. Liu[1,2,5], X. D. Chen[1,5], R. Jeantet[3,5], C. André[4], and G. Delaplace[1,5]
[1]School of Chemical and Environmental Engineering, Soochow University, Suzhou, Jiangsu, P.R. China, 215123
[2]Univ.Lille, CNRS, INRAE, Centrale Lille, UMR 8207-UMET-Unite Materiaux et Transformations, F-59000, Lille, France
[3]STLO, INRAE, Institut Agro, 35042, Rennes, France
[4]HEI (Ecole des Hautes Etudes d'Ingénieur), Département Chimie, Textiles et Process Innovants, 13, rue de Toul, 59046 Lille Cedex, France
[5]International Joint Laboratory (INRAE Villeneuve d'Ascq – Soochow University-Agrocampus Rennes), School of Chemical and Environmental Engineering, College of Chemistry, Chemical Engineering and Materials Science, Soochow University, Suzhou, Jiangsu Province 215123, China

11:30 - 12:00 **System for automated monitoring of local soil removal during cleaning in closed food processing lines with a quartz crystal sensor**
S. Gottschall , R. Murcek , S. Städtler and M. Mauermann
Fraunhofer IVV, Division Processing Technology

SESSION 6: BIOFOULING
Chair: Prof. Luis Melo

12:00 - 12:30 **Flowing Foam: An eco-efficient strategy for cleaning of contaminated industrial equipment**
H. Dallagi[1], C. Faille[1], L. Bouvier[1], L. Wauquier[1], C. Gruescu[1], F. Aloui[2] and T. Bénézech[1]
[1] Univ.Lille, CNRS, INRAE, Centrale Lille, UMR 8207-UMET-Unite Materiaux et Transformations, F-59000, Lille, France
[2] LAMIH UMR CNRS 8201, Polytechnic University of Hauts-de-France (UPHF) Department of Mechanics, Campus Le Mont Houy 59313 Valenciennes Cedex 9 – France

13:00 - 14:00 Lunch

14:15 Conference Excursion including Dinner

Wednesday, June 8, 2022

7:00 - 9:00 Breakfast

SESSION 7: FOULING MITIGATION
Chair: Aaron Smith

9:00 - 9:30 **Software-guided clamp-on power ultrasound solution for fouling mitigation in tubular heat exchangers**
P. Moilanen, T. Rauhala, S. Ahmadzai
Altum Technologies, Helsinki, Finland

9:30 - 10:00 **Interaction of heat transfer enhancement and fouling in operating heat exchangers**
E. M. Ishiyama[1], S. J. Pugh[1] and A. P. Watkinson[2]
[1]Heat Transfer Research Inc., The Surrey Technology Centre, 40 Occam Road, Guildford, Surrey GU2 7YG, UK
[2]Department of Chemical and Biological Engineering, University of British Columbia, Vancouver, BC, Canada V6T 1Z3

10:00 - 10:30 **Using Continuous Helical Flow Electric Heat Exchangers to Reduce Fouling**
D. P. Long, J. Wilson
Society of Petroleum Engineers (SPE), Watlow Electric Manufacturing Company, 6 Industrial Loop Road, Hannibal, MO, USA 63401

10:30 - 11:00 Break

SESSION 8: CFD MODELLING
Chair: Dr.-Ing. Heike Glade

11:00 - 11:30 **CFD-based Modelling of a Cohesively Separating Soil Layer in consideration of local soil distribution**
C. Golla[1], H. Köhler[2] and F. Rüdiger[1]
[1]Institute of Fluid Mechanics, Technische Universität Dresden, Germany
[2]Institute of Natural Materials Technology, Technische Universität Dresden, Germany

11:30 - 12:00 **Optimization of macro-structured pipe surfaces to improve the cleaning performance**
T. Hanisch, M. Joppa, V. Eisenrauch, S. Jacob and M. Mauermann
Fraunhofer Institute for Process Engineering and Packaging IVV, Dresden, Germany

12:00 - 12:30 **Maldistribution in shell-and-tube heat exchangers and its effect on fouling and performance**
R. Schab, A. Kutschabsky, S. Unz and M. Beckmann
Technische Universität Dresden, Dresden, Germany

12:30 - 13:00 **CFD modelling of an initial powdery layer on cooled tubular surfaces**
J. Strouhal, T. Juřena, Z. Jegla
Brno University of Technology, Institute of Process Engineering, Technická 2, 61669 Brno, Czech Republic

13:00 - 14:00 Lunch

SESSION 9: CRYSTALIZATION FOULING
Chair: Dr.-Ing. Augustin Wolfgang

14:00 - 14:30 **The potential of thermally conductive polymer composites regarding crystallization fouling mitigation**
H. Kiepfer[1] , H.-J. Bart[1] , P. Stannek[2] , M. Kuypers[2] , M. Grundler[2]
[1]Laboratory of Reaction and Fluid Process Engineering, TU Kaiserslautern, 67663 Kaiserslautern, Germany
[2]Zentrum für BrennstoffzellenTechnik, 47057 Duisburg, Germany

14:30 - 15:00 **Crystallisation fouling from aqueous solutions of clathrate hydrates**
A. Karela[1,3], S.M. Clarke[2,3], G. Kawaley[4], A.F. Routh[1,3] and D.I. Wilson[1]
[1]Department of Chemical Engineering and Biotechnology, University of Cambridge, Cambridge, CB3 0AS, UK
[2]Department of Chemistry, University of Cambridge, Cambridge, CB2 1EW, UK
[3]Centre for Environmental and Industrial Flows, University of Cambridge, Cambridge, CB3 0EZ, UK
[4]Mitsubishi Electric R&D Centre Europe BV, 17 Firth Road, Houston Industrial Estate, Livingston, UK, EH54 5DJ

15:00 - 15:30 **Investigations of crystallization fouling in columns**
K. Inderwies, H. Klein and S. Rehfeldt
Technical University of Munich, TUM School of Engineering and Design, Department of Energy and Process Engineering, Institute of Plant and Process Technology, Garching/Germany

15:30 - 16:00 Break

16:00 - 16:30 **Impact of a Surfactant on Film Flow and Crystallization Fouling in Falling Film Evaporators**
M. Waack[1], S. Nied[2] and H. Glade[1],
[1]University of Bremen, Engineering Thermodynamics, Badgasteiner Str. 1, 28359 Bremen, Germany
[2]BASF SE, 67056 Ludwigshafen, Germany

16:30 - 17:00 **Role of Zinc in Bulk Precipitation from Steaming Process of Potable Water**
A. Al-Gailani*[,1] and R. Barker[2]
[1]Department of Chemical Engineering, University of Hull, Hull, HU6 7RX, England
[2]School of Mechanical Engineering, University of Leeds, Leeds, LS2 9JT, England

19:30 - 22:30 Dinner (followed by Social Hour)

Thursday, June 9, 2022

7:00 - 9:00 Breakfast

SESSION 10: HEAT EXCHANGER NETWORKS AND DIGITAL TWIN TECHNOLOGIES
Chair: Dr. Edward Ishiyama

9:00 - 9:30 **HEATTRAX: A new approach to exchanger fouling management**
K. Vann[1], T. Matthews[1], N. Wang[1], B. Busker[1], M. Bagajewicz[2], D. Oliva[3] and R. Vargas[4]
[1]Refined Technologies, Houston, TX, USA
[2]OK-Solutions, Norman, OK, USA
[3]INGAR, Santa Fe, Santa Fe, Argentina
[4]UAP, Libertador General San Martin, Entre Rios, Argentina

9:30 - 10:00 **Fouling thickness modeling for refinery cleaning schedule optimization**
M. J. Bagajewicz[1,2,3], A. L. M. Nahes[4] and A. L. H. Costa[4]
[1]OK-Solutions, Norman OK, USA (corresponding author)
[2]Refined Technologies, Houston, TX, USA
[3]Federal University of Rio de Janeiro, Rio de Janeiro, Brazil.
[4]State University of Rio de Janeiro, Rio de Janeiro, Brazil.

10:00 - 10:30 **Fouling management through digital transformation**
E. M. Ishiyama, J. Kennedy, H. U. Zettler and S. J. Pugh
Heat Transfer Research, Inc., 40 Occam Road, Guildford, Surrey, GU2 7YG, UK

10:30 - 11:00 Break

11:00 - 11:30 **TotalEnergies Fouling Management Program**

E. Gomez[1], L. France[1], E. M. Ishiyama[2], J. Kennedy[2] and S. J. Pugh[2]
[1]TotalEnergies, Heat Transfer Research, Inc., 40 Occam Road, Guildford, Surrey, GU2 7YG, UK
[2]Heat Transfer Research, Inc., 40 Occam Road, Guildford, Surrey, GU2 7YG, UK

SESSION 11: INDUSTRIAL CLEANING
Chair: Simon Pugh

11:30 - 12:00 **Thermal heat exchanger cleaning**

R. Mol
Thermo-Clean Group, Dellestraat 45, B-3550 Heusden-Zolder

12:00 - 12:30 **Developments personal safety for Industrial Cleaning**

H. Borgt
Dow Benelux b.v., P.O. Box 48, 4530AA, Terneuzen, The Netherlands

12:30 - 13:00 **Simultaneous Effective Removal of Iron Polysulfide and Polyolefin Fouling from Twisted Tube Heat Exchangers in Hydrocracker Process using Ultrasonic Chemical Cleaning**

R. A. Shank[1] and T. R. McCartney[2]
[1]136-26 Westlake Glen; Strathmore, AB; T1P 1X5, Canada
[2]2-321 37 Ave NE; Calgary, AB; T2E 6P6, Canada

13:00 - 14:00 Lunch

14:00 - 14:30 **The economic impact of better heat exchanger cleaning on an oil refinery – theoretical, expected and actual results**

B.N. Kieser[1], R. Tomotaki[2], J. Loyola-Fuentes[3], E. Diaz-Bejarano[3] and F. Coletti[3]
[1]TechSonic LP, 8703 - 98 Street, Morinville, Alberta Canada T8R 1K6,
[2]Clean As New, 1303 Thompson Park Drive, Baytown, Texas 77521 USA
[3]Hexxcell Ltd., Foundry Building, 77 Fulham Palace Road, London, UK
W6 8AF

14:30 - 15:00 **Chemical Cleaning of Crude Oil Fouling Deposits; Applying the Coke Spectrum**

R. A. Shank[1] and T. R. McCartney[2]
[1]136-26 Westlake Glen; Strathmore, AB; T1P 1X5, Canada
[2]2-321 37 Ave NE; Calgary, AB; T2E 6P6, Canada

15:00 - 15:30 **Multistage fouling fracturing method**

E. Cherednik[1] and A. Belomestnykh[2]
[1]Angara Global, Plantagekade 58, 1018 ZV, Amsterdam, Netherlands
[2]Alnair Mineral Services DMCC, 1104, Reef Tower, Cluster O, Jumeirah Lakes Towers, Dubai, UAE, 5003335

15:30 - 16:00 Break

SESSION 12: SURFACE MODIFICATIONS (PART 1)
Chair: Dr.-Ing. Les Jackowski

16:00 - 16:30 **Accelerated Decarbonization Through In-Place Surface Treatment Technologies**
V. Veedu[1], M. Nakatsuka[2], S. Thapa[3]
[1]Oceanit, 8402 Scranton St, Houston, TX, 77061, United States
[2]Oceanit, 828 Fort Street Mall, Suite 600, Honolulu, HI, 96813, United States
[3]Oceanit, 8402 Scranton St, Houston, TX, 77061, United States

16:30 - 17:00 **Reduce OPEX and CAPEX in refining process unit fired heaters and heat exchangers using tubacoat technology**
S. Lodha
Tubacoat S.L., Parque Científico y Tecnológico de Bizkaia Ibaizabal Bidea, Edificio 702, 1ª planta, Derio, Bizkaia, 48160, Spain

19:30 - 20:30 Conference Banquet (followed by Social Hour)

Friday, June 10, 2022

7:00 - 9:00 Breakfast

SESSION 13: SURFACE MODIFICATIONS (PART 2)
Chair: Dr. Hans Zettler

9:00 - 9:30 **Anti-fouling coatings: A critical review and development roadmap**
Simone Mancin[1,2] and Francesco Coletti[2,3]
[1]University of Padova, Dept. Management and Engineering, Str.lla S. Nicola 3 36100 Padova
[2]Brunel University London, Chemical Engineering Department, Uxbridge, UK
[3]Hexxcell Ltd, Foundry Building, 77 Fulham Palace Road, W6 8AF, London, UK

9:30 - 10:00 **Investigation of icephobic coatings for supercooling heat exchangers under submerged conditions using ice detection equipment**
Jens R. Frandsen[1], Ricardo Losada[1], Daniel Carbonell[2]
[1]Danish Technological Institute, Kongsvang Allé 29, 8000 Aarhus C, Denmark
[2]SPF Institut für Solartechnik, OST Fachhochschule Ostschweiz, Oberseestrasse 10, 8640 Rapperswil-Jona, Switzerland

10:00 - 10:30 **Butadiene chemical reaction fouling in Steam Cracker and butadiene unit, overview and control by surface modification**
J.-P. Thoret-Bauchet[1], Lionel Renaud[2], Ludovic Galliot[3]
[1]TotalEnergies One Tech Belgium, Zone Industrielle Feluy C, B-7181 Seneffe – Belgium
[2]TotalEnergies TRTG - Zone Industrielle du Port Autonome du Havre – 76700 – Harfleur – France
[3]TotalEnergies CSTJF - Avenue Larribau - 64018 - PAU - France

10:30 - 11:00 Break

SESSION 14: SURFACE MODIFICATIONS (PART 3)

Chair: Dr. Hans Zettler

11:00 - 11:30 **Novel surface treatment to mitigate fouling in heat exchangers and process equipment**

J. Ayutsede[1], S. Kerber[2], E. Curran[3], B. Dooley[4], I. Luna,[5] L. Jackowski[5]
[1]Chevron Products Company, Richmond, CA, USA
[2]Material Interface Inc., N73W22301 Willow View Drive, Sussex, WI 53089 USA
[3]Curran International, 4610 Vicksburg St, Dickinson, TX 77539 USA
[4]Chevron Technical Center, 1400 Smith St, Houston, TX 77002 USA
[5]Chevron Technical Center, Richmond, CA, USA

11:30 - 12:00 **Coatings to reduce fouling in plate heat exchangers: Two case studies**

O. Santos[1], Y. Adriaenssens[2], C. Wictor[3] and M. Nilsson[3]
[1]Materials Technology and Chemistry, Alfa Laval Lund AB, PO Box 74, SE-221 00 Lund, Sweden.
[2]Chemours Belgium BVBA, Antoon Spinoystraat 6A, 2800 Mechelen, Belgium.
[3]Gasketed Plate Heat Exchangers – Technology Development, Alfa Laval Lund AB, PO Box 74, SE-221 00 Lund, Sweden.

12:00 - 12:30 **Pigmented antifouling coatings for improved on-site inspection**

C. Bischoff[1], J. R. Frandsen[1], I. Luna[2], L. Jackowski[2]
[1]Danish Technological Institute, Kongsvang Allé, DK-8000 Aarhus C
[2]Chevron Energy Technical Center, 100 Chevron Way, Richmond, CA 94801

12:30 - 13:00 **Final Discussion**

13:00 - 14:00 Lunch