The 69th Annual Meeting of the International Society of Electrochemistry

Electrochemistry from Knowledge to Innovation
2 to 7 September 2018
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Contents List

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Symposium 14 Electrochemical Engineering: Research towards Deployable Technology

Room: Sala Indaco

Chaired by: Geoff Kelsall and Mark E. Orazem

14:00 to 14:15

Mark E. Orazem *(Department of Chemical Engineering, University of Florida, Gainesville, USA)*, Arthur Dizon

Mathematical Model and Optimization for Electrokinetic Dewatering of Phosphatic Clays

14:15 to 14:30

Maria Sofia Palagonia *(Production Engineering, University of Bremen, Bremen, Germany)*, Doriano Brogioli, Fabio La Mantia

Investigation on the Working Parameters in a Flow-Through-Electrodes Cell for Lithium Recovery

14:30 to 14:45

José Fernando Pérez *(Department of Chemical Engineering, University of Castilla-La Mancha, Ciudad Real, Spain)*, Cristina Sáez, Javier Llanos, Conrado López, Pablo Cañizares, Manuel A. Rodrigo

A Pressurized-jet Aerated Microfluidic-through H_2O_2 Electrolyzer: Concept, Construction Details and Experimental Results

14:45 to 15:00

Roel Bisselink *(Food and Biobased Research, Wageningen University and Research, Wageningen, Netherlands)*, Martin Zijlstra, Earl Goetheer

Improving the electrochemical production of hydrogen peroxide

15:00 to 15:15

Jonas Hereijgers *(Advanced Reactor Technology, University of Antwerp, Antwerp, Belgium)*, Jonathan Schalck, Jonas Lölsberg, Matthias Wessling, Tom Breugelmans

Indirect 3D printing towards mixer-electrodes

15:15 to 15:30

Enrico Volpi *(ESP department, Università degli Studi di Milano, Chemical Newtech S.p.a., Milano, Italy)*, Andrea Grassi, Paolo Rossi, Stefano Trasatti

Development of a testing procedure for MMO electrodes used in polarity reversal electrochlorination cells

15:30 to 15:45

Elena Baranova *(Department of Chemical and Biological Engineering, University of Ottawa, Ottawa, Canada)*, Mohamed Houache, Kara Hughes, Abdulgadir Ahmed

Electrochemical Valorization of Glycerol on Bimetallic Nickel-Rich Nanoparticles: The Role of Pd and Bi on Product Selectivity

15:45 to 16:00

Coffee Break

16:00 to 16:15

Howie N. Chu *(Department of Engineering Science, University of Oxford, Oxford, United Kingdom)*, Charles Monroe

Parameterizing Large-Format Prismatic Lithium-Ion Cells with Lock-In Thermography

16:15 to 16:30

Philipp Marzak *(Department of Physics, Technical University of Munich, Garching, Germany)*, Jeongsik Yun, Albrecht Dorsel, Armin Kriele, Ralph Gilles, Oliver Schneider, Aliaksandr Bandarenka

Electrodeposited $Na_2Ni[Fe(CN)_6]$ Thin Film Cathodes Exposed to Simulated Aqueous Na-ion Battery Conditions

16:30 to 16:45

Min Deng *(MagIC-Magnesium Innovation Centre, Helmholtz-Zentrum Geesthacht, Geesthacht, Germany)*, Daniel Höche, Sviatlana Lamaka, Mikhail Zheludkevich

Novel Mg-Ca Alloys as Anodes for Primary Mg-air Batteries

16:45 to 17:00

Horacio Antonio Figueredo Rodriguez *(Faculty of Engineering and Environment, University of Southampton, Southampton, United Kingdom)*, Rachel McKerracher, Carlos Ponce de Leon

Iron air batteries: design and characterisation of the iron electrodes

17:00 to 17:15

Elad Halfon *(Grand Technion Energy Program, Technion - Israel Institute , Haifa, Israel)*, Matthew Suss

Highly Conductive Metal-based Flowable Electrodes

17:15 to 17:30

Danielle Ragonis *(Chemical Engineering, Technion, Haifa, Israel)*, Ilya Loiferman, Robert Gloukhovski, Matthew Suss

Zinc bromine flow batteries with suspension electrode

17:30 to 17:45

Federico Poli *(BETTERY s.r.l., Massafra, Italy)*, Alessandro Brilloni, Francesca De Giorgio, Francesca Soavi

Design of Novel Redox Flow Batteries

17:45 to 18:00

Katharina Schafner *(Institute of Chemical and Electrochemical Process Engineerin, Clausthal University of Technology, Clausthal-Zellerfeld, Germany)*, Thomas Turek

Improvement of the long-term VFB operation by modelling crossover processes and development of capacity balancing methods

18:00 to 18:15

Rona Ronen *(Grand Technion Energy Program, Technion, Haifa, Israel)*, Matthew Suss

Extending Flow Battery Theory to include Homogeneous Reactions

18:15 to 18:30

Fabrizio Vicari *(Dipartimento dell'Innovazione Industriale e Digitale (DIID), University of Palermo, Palermo, Italy)*, Alessandro Galia, Onofrio Scialdone

Thermally Regenerative Ammonia Batteries for Waste-Heat Exploitation

18:30 to 18:45

Giovanni Sotgiu *(Department of Engineering, Roma Tre University, Rome, Italy)*, Elisabetta Petrucci, Daniele Montanaro, Monica Orsini

Tuning the Composition of Mixed Transition Metal Oxide Electrodes Containing Manganese for Energetic and Environmental Applications

Thermally Regenerative Ammonia Batteries for Waste-Heat Exploitation

Fabrizio Vicari, Alessandro Galia, Onofrio Scialdone

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It is widely accepted that one of the most important issue to be faced by the scientific community is how to sustain the modern way of living and the related energy demand. While a long term target is the transition to a full-renewable energy system, a closer exigency is the optimization of the processes already existing. It has been calculated that about 370.41 TWh of potential energy is annually lost in Europe in the form of waste-heat from the industrial sector [1]. Waste heat comprises all the thermal energy with a temperature below 130 °C [2] (or 300 °C [1]), that hardly can find a useful application with the state of the art industrial technologies. Indeed, electrochemical technologies are nowadays under investigation for the potentiality they own to harvest, at least, part of this energy [2]. Among the others, Thermally Regenerative Ammonia Batteries (TRAB) were reported to have very high current density and simple operation [3], but most of the work accomplished up to now was devoted to the optimization of the generation phase in conventional divided reactors. In this work, our efforts for the optimization of the regeneration phase are reported, along with a detailed exposure of the apparatus adopted. In addition, the use of an undivided continuous-flow, microfluidic reactor is proposed to sustain higher current densities with reduced investment cost. The effect of some relevant operative parameters on the maximum current density that can be gained in such a microfluidic device is also discussed.

References

1. Panayiotou GP, Bianchi G, Georgiou G, et al (2017) Preliminary assessment of waste heat potential in major European industries. Energy Procedia 123:335–345 . doi: 10.1016/j.egypro.2017.07.263
2. Gao C, Lee SW, Yang Y (2017) Thermally Regenerative Electrochemical Cycle for Low-Grade Heat Harvesting. ACS Energy Lett 2:2326–2334 . doi: 10.1021/acsenergylett.7b00568
3. Zhang F, Liu J, Yang W, Logan BE (2015) A thermally regenerative ammonia-based battery for efficient harvesting of low-grade thermal energy as electrical power. Energy Environ Sci 8:343–349 . doi: 10.1039/C4EE02824D