Book of Abstracts

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POSTER PRESENTATIONS

Electrolytes and membranes

P01 **Adam Mackowiak** (University of Technology, Poznan, Poland), Paweł Jeżowski , Yukiko Matsui , Kazunari Soeda , Masashi Ishikawa , Krzysztof Fic, *"Redox-active electrolytes for pre-lithiation of graphite electrode in lithium-ion capacitors"*

P02 **Amelia Klimek** (Poznan University of Technology, Institute of Chemistry and Technical Electrochemistry, Poznan, Poland)**,** Justyna Piwek, Elzbieta Frackowiak **"***Improving the performance of electrochemical capacitors by addition of iodide"*

P03 **Minju Thomas** (CNR-ITAE, Istituto di Tecnologie Avanzate per l'Energia "Nicola Giordano" S. Lucia, Messina, Italy; Department of Chemistry and Chemical Technology, University of Calabria, Rende, Italy), , Catia Cannilla, Antonino Brigandì, Francesco Lufrano, Isabella Nicotera, **"***Mesoporous Carbon Electrodes for Supercapacitor with Sodium ion Exchange Aquivion as Electrolyte membrane"*

P04 **Svetlana Veleva** (Institute of Electrochemistry and Energy Systems, Bulgarian Academy of Sciences, Sofia, Bulgaria), B.Karamanova, A. Stoyanova, A. Arenillas, Natalia Rey, *"Effect of polymer-based electrolyte on electrochemical properties of supercapacitor systems"*

P05 **Ilona Acznik** (Łukasiewicz Research Network - Institute of Non-Ferrous Metals Division in Poznan, Poznan Poland), Paulina Bujewska, Krzysztof Fic, Katarzyna Lota, "*Influence of the phenomenon of self-organization of liquid crystals on the performance of an electrochemical capacitor"*

P06 **Paulina Bujewska** (Łukasiewicz Research Network - Institute of Non-Ferrous Metals Division in Poznan, Poznan Poland), Krzysztof Fic, Katarzyna Lota, Ilona Acznik, *"Effect of Pluronic triblock copolymer as the electrolyte additive on the electrochemical capacitors performance"*

P07 **Alessandro Brilloni** (Department of Chemistry "Giacomo Ciamician", Alma Mater Studiorum – Università di Bologna, Via Selmi 2, 40126, Bologna, Italy), Elisabetta Petri, Federico Poli, Francesca Soavi, *"Application of Water in Salt electrolytes for low environmental impact supercapacitors"*

P08 **Metin Orbay** (Friedrich-Schiller-University Jena, Institute of Technical Chemistry and Environmental Chemistry and Center for Energy and Environmental Chemistry, Jena, Germany), Andrea Balducci, *"Glyoxylic acetals-based electrolytes for high power applications"*

P09 **Khai Shin Teoh** Friedrich-Schiller-University Jena, Institute for Technical Chemistry and Environmental Chemistry and Centre for Energy and Environmental Chemistry Jena (CEEC Jena) Philosophenweg, Jena, Germany) Massimo Melchiorre, Francesco Ruffo, Andrea Balducci, *"Sustainable solvents for electrical double layer capacitors"*

P10 **Arianna Massaro** (Institute for Technical Chemistry and Environmental Chemistry, Friedrich Schiller University, Jena, Germany; Department of Chemical Sciences, University of Naples "Federico II", Comp. Univ. Monte Sant'Angelo, Naples, Italy; National Reference Center for Electrochemical Energy Storage (GISEL) – INSTM, Firenze, Italy), Timo Stettner, Claudio Gerbaldi, Ana B. Muñoz-García, Michele Pavone, Andrea Balducci, *"Physico-chemical investigation on the use of protic ionic liquids in supercapacitors: a joint experimental-theoretical study"*

Effect of polymer-based electrolyte on electrochemical properties of supercapacitor systems

S. Veleva[1], B.Karamanova[1], A. Stoyanova[1], A. Arenillas[2], Natalia Rey[2]

[1] Institute of Electrochemistry and Energy Systems, Bulgarian Academy of Sciences, Sofia, 1113, Bulgaria
[2] Instituto de Ciencia y Tecnología del Carbono, INCAR-CSIC. Francisco Pintado Fe, 26, 33011, Oviedo, Spain

e-mail address: svetlana_veleva@iees.bas.bg

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Supercapacitors are electrochemical energy storage devices that store and release energy by reversible adsorption and desorption of ions at the interfaces between electrode materials and electrolytes. In the last few years, the attention of scientists working in the field of supercapacitors has been focused mainly on the development of electrode structures based on carbon, metal oxide and conductive polymer. The right choice of electrolyte type is essential to achieve good electrochemical performance.
The most popular electrolytes for supercapacitors are aqueous and organic, with increasing use of ionic liquids (IL). They are served as solvents in a wide temperature range and possess high thermal, chemical and electrochemical stability, low volatility and non-flammability. Among the problems limiting their wider use is their poor compatibility with microporous carbon.
The development of polymer ionic liquids (PIL) is a modern approach with growing interest, as their significant advantage is the ability to create stable and highly efficient polymer electrolytes.
For the purposes of the present study, a polymeric ionic liquid based on pyrrolidine was produced. The anion exchange method was applied to a quaternized poly (diallyl methyl ammonium iodide) previously synthesized by the team. The obtained PIL was characterized by modern physicochemical methods and was used as an electrolyte in supercapacitor systems.
Two-electrode electrochemical cells based on activated carbon YP-50F a commercial product of the company "Kuraray Europe" or synthesized carbon xerogel, Ni-Mn phosphates as poly-composite electrodes and an electrolyte containing PIL, IL and $LiBF_4$ were assembled.
CV-curves, galvanostatic charging / discharging and long term tests were performed, with the help of which the capacitive characteristics and the stability of the developed supercapacitors were monitored. The correlation between polymer electrolyte composition and structure and morphology of studied electrode materials was discussed.

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