Congresso Brasileiro de Engenharia e Ciência dos Materiais
24 a 28 de Novembro de 2024 | Fortaleza - CE - Brasil

Data e hora: 26/11/2024 | 09:50
Sessão: Sessão de Poster 3
Tipo: poster

Ref.: MCoMeim32-001

ETHYLENE GLYCOL WITH LITHIUM PERCLORATE FOR SOLID STATE ELECTROCHEMICAL SUPERCAPACITORS

Apresentador: Daniel Vieira Silva

Autores (Instituição): Silva, D.V.(Instituto de Pesquisas Energéticas e Nucleares); Garcia, R.H.(Instituto de Pesquisas Energéticas e Nucleares); Lazar, D.R.(Instituto de Pesquisas Energéticas e Nucleares); Faria, R.N.(Instituto de Pesquisas Energéticas e Nucleares);

Resumo:
Lithium salts have been employed in aqueous and non-aqueous electrolytes of supercapacitors. In non-aqueous electrolytes, lithium salts are commonly dissolved in carbon-based solvents such as ethylene carbonate and dimethyl carbonate. Ethylene carbonate is an important component for the manufacture of electrolytes for rechargeable lithium-ion batteries. Due to the high conductivity, well known common electrolytes for carbon-based electrochemical supercapacitors are the tetraethylammonium tetrafluoroborate salt (NEt 4 BF 4) dissolved in ethylene carbonate (EC) or acetonitrile (ACN). These organic solvents have the disadvantage of requiring a controlled atmosfere chamber for handling of the liquid due to their susceptibility to moisture and intrinsic toxicity. In addition, organic electrolytes also evaporate easily, and commercial supercapacitors are limited to operating near room temperature (<70ºC). In this study, ethylene carbonate was replaced by ethylene glycol (C 2 H 6 O 2) which

is a cheap and easy-to-use material, famous for its use as an antifreeze. Ethylene glycol was also employed in other applications such as catalysts, support electrolyte and stabilizer. Ethylene glycol is a synthetic, colorless, and odorless liquid with low vapor pressure (0.092 mmHg at 25ºC) and is relatively safe for the environment, decomposing in the air in approximately 10 days and in the soil and water in a few weeks. Solid state electrochemical supercapacitors were produced using activated carbon electrodes with electrolytes based on ethylene glycol and lithium perchlorate in different molar ratios. These devices were electrochemically characterized by cyclic voltammetry varying the scan rate from 1mV.s -1 to 300 mV.s -1 , by galvanostatic cycle with current densities of 10 to 30 mA.g -1 and by electrochemical impedance in the range of 1mHz to 100 KHz varying the voltage from 0V to 1V. The cyclic voltammograms at room temperature resulted in a specific capacitance of 47 Fg -1 for the ethylene glycol and lithium perchlorate ratio 1:1.