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O.S.B.4.

Activated track etched carbon for supercapacitor electrodes

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A novel self-supporting carbon thin film supercapacitor electrode was developed starting from polyimide (Kapton) foil. In the first step of the electrode synthesis, latent tracks were inscribed in the starting polymer by irradiation with 253 MeV Kr ions. Next, cylindrical channels were formed by selective chemical etching with NaOCl along the ion tracks, creating track etched polymer. With subsequent carbonization and activation of the track etched polymer, activated track etched carbon was produced. A range of samples were obtained by varying the chemical etching time of the irradiated polymer. The influence of the chemical etching time on the electrochemical properties of the supercapacitor electrodes was investigated by cyclic voltammetry and electrochemical impedance spectroscopy.

O.S.B.5.

The influence of fluorine doping on the structural and the electrical properties of $LiFePO_4$ powder

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Low intrinsic electronic conductivity is the main weakness of $LiFePO_4$ for the use as cathode material in lithium ion batteries. Here is presented an experimental proof of the theoretical prediction that fluorine doping of $LiFePO_4$ can enhance its electrical conductivity. $LiFePO_4$ and fluorine-doped $LiFePO_4$ olivine type, carbon-free powders are synthesized and examined. Crystal structure refinements in the space group Pnma reveal that doping with fluorine ions preserves olivine structure with the reduction of both the lattice parameters and the antisite defect, and an increase of a crystallite size. A small amount of incorporated fluorine enhances electrical conductivity from 4.6×10^{-7} Scm^{-1} to 2.3×10^{-6} Scm^{-1} and has positive impact on the electrochemical performances. Several spectroscopy techniques (Mössbauer, FTIR, and Raman) disclose differences between two powders and additionally support the findings of both the Rietveld refinement and the conductivity measurements.