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Characterization and Electrochemical Properties of $Cu_2P_2O_7$ Nanoparticles Prepared by Hydrothermal Method

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Copper phosphate ($Cu_2P_2O_7$) nanostructures were synthesized by hydrothermal method. The precursor products were calcined at 500, 600 and 700 oC in air for 3 h. Thermogravimetric/differential thermal analysis (TG/DTA), X-ray diffraction (XRD), scanning electron microscopy (SEM) and Fourier transform infrared spectroscopy (FT-IR) were used to study the phase formation, crystalline structure, morphology and functional group of samples. Electrochemical properties were measured by cyclic voltammetry (CV) and galvanostatic charge-discharge (GCD). XRD analysis confirms a monoclinic crystal structure of $Cu_2P_2O_7$ with space group C2/c. SEM micrographs of calcined samples show a fused grain structure for smaller crystals with more porous and rough surfaces. The CV results show the redox peaks in all curves, exhibiting reversible electron-transfer for Faradaic redox reactions with the largest CV areas for sample calcined at 600℃. The $Cu_2P_2O_7$ positive electrodes show a maximum high specific capacitance. In addition, the result of the electron-active sites participated in the Faradaic redox reaction indicat a valence interchange or charge hopping of cations

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