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## Characterization and Electrochemical Properties of $\text{Cu}_2\text{P}_2\text{O}_7$ Nanoparticles Prepared by Hydrothermal Method

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Copper phosphate ( $\text{Cu}_2\text{P}_2\text{O}_7$ ) nanostructures were synthesized by hydrothermal method. The precursor products were calcined at 500, 600 and 700 °C 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  $\text{Cu}_2\text{P}_2\text{O}_7$  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°C. The  $\text{Cu}_2\text{P}_2\text{O}_7$  positive electrodes show a maximum high specific capacitance. In addition, the result of the electron-active sites participated in the Faradaic redox reaction indicate a valence interchange or charge hopping of cations.

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