Synthesis and Electrochemical Properties of Spinel LiCrTiO₄ and Its Application in LiFePO₄/LiCrTiO₄ Full Cells

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Spinel structure LiCrTiO₄ was prepared through a solid-state reaction using Li₂CO₃, Cr₂O₃, and TiO₂ as raw materials. X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), transmission electron microscopy (TEM), scanning electron microscopy (SEM) was used to characterize the structure of LiCrTiO₄. Electrochemical properties of LiCrTiO₄ were studied by cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS) and charge-discharge cycling performance. Electrochemical testing showed that LiCrTiO₄ has an excellent electrochemical capacity of 164 mAh·g⁻¹ at a 0.5C-rate, and 116.1mAh·g⁻¹ at a 10C-rate with stable cycling performance. Furthermore, LiFePO₄/LiCrTiO₄ full cells were constructed using LiCrTiO₄ as the anode electrode that displayed superior cycling stability at high rates. The LiFePO₄/LiCrTiO₄ full cell exhibited a charge capacity of 136.6mAh·g⁻¹ and discharge capacity of 116mAh·g⁻¹ at a 0.2C-rate, and 96.4mAh·g⁻¹ at 2C-rate.

Keywords: Carbothermal reduction, LiCrTiO₄ LiFePO₄/LiCrTiO₄ full cell, Solid state reaction

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