

Synthesis of Metal Oxide Nanoparticle by Continuous Supercritical Hydrothermal Synthesis for Anode Materials of Lithium Ion Battery

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Metal oxide nanoparticles were prepared using continuous supercritical hydrothermal synthesis method that can be applied for mass production. Hydrothermal synthesis of metal oxide (MO, where M is Ni, Cu, Fe, Mn, or Co) nanoparticles from metal nitrate aqueous solution was carried out at 673 K and pressures 30 MPa. The as-synthesized metal oxide nanoparticles were characterized by a variety of techniques, such as XRD, SEM, BET surface area measurement, and electrochemical test. The electrochemical properties of the as-synthesized metal oxide nanoparticles were investigated to determine their suitability as potential anode materials for lithium-ion batteries. In case of Co₃O₄, the Li/Co₃O₄ cell was charge-discharged at a constant current density of 0.2857mAcm⁻² and showed good charge-discharge capacity. The discharge capacity of the Li/Co₃O₄ cell drastically decreased with cycle number, but still can be maintained at higher value than carbon material (372 mAhg⁻¹). The supercritical hydrothermal synthesis method might be a useful method to prepare metal oxide nanoparticles for the anode material of lithium batteries.