

Synthesis and properties of mesoporous $\text{MO}_x\text{-ZnO}$ (M = Mn, Co, Ni, and Cu) nanoparticles by polyol process for LIBs

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Zinc Oxide (ZnO) has been under a great deal of attention for decades in the field of solar cells, semiconductor lasers, LIBs, and other devices. As an anode material for LIBs, ZnO has various advantages such as high theoretical capacity (987mAh/g), low cost, and good physical and chemical stability. However, its large volume change (over 228%) during cycling and intrinsic poor electronic conductivity would result in drastic capacity fading and poor cyclability.

Mesoporous $\text{MO}_x\text{-ZnO}$ would improve the electrochemical performance, since the pores can act as a buffer to relieve the volume change and mixed oxides would increase the electronic conductivity.

Mixed oxides have been adopted as the anode materials to improve the electrochemical properties through the synergetic effects. Combining ZnO with other metal oxides would improve initial capacity and reduce degradation during cycling.

In this work, mesoporous $\text{MO}_x\text{-ZnO}$ (M = Mn, Co, Ni, and Cu) were synthesized by heating under reflux. The synthesized materials were analyzed by X-ray diffraction (XRD), nitrogen adsorption-desorption isotherms, and scanning electron microscopy (SEM).