Hollow Microspherical $\text{Li}[\text{Li}_{0.24}\text{Ni}_{0.38}\text{Mn}_{0.38}]\text{O}_2$ as Cathode Material for Lithium-Ion Batteries with Excellent Electrochemical Performance

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Li-rich hollow microspherical $\text{Li}[\text{Li}_{0.24}\text{Ni}_{0.38}\text{Mn}_{0.38}]\text{O}_2$ sample was successfully synthesized by a coprecipitation approach followed by high-temperature calcinations. The compositions and structures of Li-rich hollow microspherical $\text{Li}[\text{Li}_{0.24}\text{Ni}_{0.38}\text{Mn}_{0.38}]\text{O}_2$ were investigated by X-ray diffraction (XRD), scanning electron microscopy (SEM), and X-ray photoelectron spectroscopy (XPS) and the results revealed that the sample possesses typical $\alpha\text{-NaFeO}_2$ layered structures with a weak reflection of LiMnO_6 , and of hollow microspherical morphology with porous surfaces. Electrochemical measurements showed that the Li-rich hollow microspheres deliver good cycling stabilities and rate capabilities with initial discharge capacities of 229, 213 and 202 mAh g^{-1} at current density of 340, 680 and 1000 mA g^{-1} , respectively, with fewer capacity above 4.5 V than that of Li-rich spinel-layered Li–Ni–Mn–Co–O cathode materials. The excellent electrochemical performances of hollow microspherical Li-rich $\text{Li}[\text{Li}_{0.24}\text{Ni}_{0.38}\text{Mn}_{0.38}]\text{O}_2$ could be related to the synergistic effect of well-regulated morphologies and appropriate sizes as well as the porous surfaces.

Keywords: Lithium-ion batteries; Cathode material; Li-rich layered oxide; Hollow microspheres; Electrochemical performances

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