Electrochemical Performance of $\text{LiNi}_{0.5-x}\text{Zr}_x\text{Mn}_{1.5}\text{O}_4$ ($x = 0.00, 0.03, 0.05, 0.10$) cathode materials for Lithium-ion Batteries

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$\text{LiNi}_{0.5-x}\text{Zr}_x\text{Mn}_{1.5}\text{O}_4$ ($x = 0.00, 0.03, 0.05, 0.10$) were prepared by a combustion synthesis method. The results of X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FT-IR) reveal that the as-synthesized $\text{LiNi}_{0.5-x}\text{Zr}_x\text{Mn}_{1.5}\text{O}_4$ ($x = 0.00, 0.03, 0.05, 0.10$) samples predominantly exist as ordered P4₃32 space group and the second phase ZrO_2 appears when the Zr content reaches 0.05. Scanning electron microscopy (SEM) shows that the samples with different Zr content present porous morphology and have less particle sizes than the bare sample of $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$. The electrochemical performances of $\text{LiNi}_{0.5-x}\text{Zr}_x\text{Mn}_{1.5}\text{O}_4$ ($x = 0.00, 0.03, 0.05, 0.10$) samples suggest that the cycle performance and rate capability both at 25°C and 55°C are significantly improved after Zr modifying.

Keywords: $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$, Electrochemical performance, Rate capability, Lithium-ion batteries

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