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A comparative study of crystalline and amorphous $Li_{0.5}La_{0.5}TiO_3$ as surface coating layers to enhance the electrochemical performance of $LiNi_{0.815}Co_{0.15}Al_{0.035}O_2$ cathode

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Abstract:

Surface coating is an effective strategy to boost the application of $LiNi_{0.815}Co_{0.15}Al_{0.035}O_2$ in the lithium ion batteries. The crystalline state of the coating layer is crucial for the transportation of lithium ions, the suppression of involved side reaction and the improvement of electrode structure stability, which ultimately determine the electrochemical performance. Here, the effects of crystalline state of $Li_{0.5}La_{0.5}TiO_3$ on the electrochemical performance of $LiNi_{0.815}Co_{0.15}Al_{0.035}O_2$ are comparatively investigated. The $Li_{0.5}La_{0.5}TiO_3$ coating layer with a thickness of about 2 nm is introduced on the surface of $LiNi_{0.815}Co_{0.15}Al_{0.035}O_2$, and the crystalline state (crystalline or amorphous) of coating layer is successfully controlled by tuning post-annealing temperature. The structure stability, dynamics performance, reaction activtiy and electrochemical performance of the coated and pristine samples are investigated. Compared with the pristine sample, the coated materials both demonstrate superior