

Electrochemical Properties of Ordered Mesoporous Metal Oxide Depending on Their Surface Modification

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Transition metal oxide shows a specific capacity of 2-3 folds to graphite (372 mAh g^{-1}) because it undergoes a conversion reaction yielding pure metal and Li_2O . Among them, CoO has high capacity (715 mAh g^{-1}). However, it occurs extreme volume changes ($> 100\%$) during lithiation and de-lithiation leading to material cracking and degradation, which would result in the loss of electrical conductivity and a rapid capacity fading in the cycling.

Ordered mesoporous CoO were previously synthesized since each mesopore acts as a buffer for volume changes. But it tends to show drastic capacity fading. So, we distinctively suggested useful surface modification to enhance cycle capacity retention. Here, we report simple and effective strategy through surface modification in ordered mesoporous CoO by silylation with Hexamethyldisilazane. Furthermore, we applied gas treatment procedures under air, N_2 , and H_2 atmospheres, which allow to modify metal oxides surface parameters, especially. The surface chemistry of ordered mesoporous CoO expects to efficiently work during lithiation and de-lithiation and improve cycle capacity.