Synthesis of Ordered Mesoporous Co_3O_4@Si Multilayers as Anode Materials for Lithium Ion Batteries

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Transition metal oxides have been investigated as alternative anodes for lithium ion battery. Cobalt oxide (Co_3O_4) has high capacity (890 mAh g^{-1}) due to conversion reaction. However, it occurs extreme volume changes during lithiation and de-lithiation leading to material cracking and degradation.

To solve these adverse problems, Some methods have been used. First, the ordered mesoporous Co_3O_4 were synthesized since the nano-structures can increase the rapid transport of lithium ion and electron and the each mesopore acts as a buffer for volume changes. Second, we distinctively suggested useful surface modification for enhancing rate capability. The Co_3O_4 surface attached functional groups are expected to act important role in electrochemical performance.

Herein, we report simple and effective strategy to synthesize ordered mesoporous Co_3O_4 with surface modification by silylation. And as-prepared sample is calcined at 500°C to form Si-layer. It is repeated four times to set up 4 layer of Si. The surface chemistry of ordered mesoporous Co_3O_4 expects to work efficiently during lithiation and de-lithiation and improve rate capability.