Synthesis, Characterization and Electrochemical Performance of Cobalt Oxides for Supercapacitor

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Cobalt oxides were prepared by calcinating the precursor which precipitated from $\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ at pH=10.08, 9.90, 9.75, 9.64 $\text{NH}_3\text{-NH}_4^+$ buffer solution. XRD, XPS and SEM analysis proved that all of the samples were Co_3O_4 and CoO mixing with honeycomb-like morphology. High buffer pH acted as conducive solution when Co (II) convert to Co (III). Electrochemical performance test indicated that the high Co (III) content is excellent for the electrochemical performance. But when the pH of the buffer is high, it is not conducive to the uniform distribution of sample particles, which can affect its electrochemical performance. So at the buffer pH 9.90, a higher Co (III) with excellent uniform degree cobalt oxides was obtained and exhibited best electrochemical performance. And when the current density of $1 \text{ A} \cdot \text{g}^{-1}$, the specific capacitance up to $726 \text{ F} \cdot \text{g}^{-1}$.

Keywords: Cobalt oxides; Preparation pH; Supercapacitor; Electrochemical properties

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