Preparation and Electrochemical Performance of CoOOH-Coated $\text{Ni}_{0.8}\text{Mn}_{0.2}(\text{OH})_2$ Cathode Materials

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CoOOH-coated $\text{Ni}_{0.8}\text{Mn}_{0.2}(\text{OH})_2$ samples were prepared by chemical coprecipitation method, and the cobalt mass fractions were 2.5%, 5%, 7.5% and 10%. X-ray diffraction measurements showed that the samples were mainly composed of $\beta\text{-Ni}(\text{OH})_2$, and some of the CoOOH-coated samples contained a small amount of impurities. Scanning electron microscopy measurements showed the CoOOH attachment on the surface of the sample particles. Cyclic voltammetry results showed that CoOOH coated on the surface of the sample could reduce the difference between oxidation and reduction peak potentials and increase the oxygen evolution potential of the electrode. Constant current charge–discharge results showed that sample CoOOH=5% yielded the highest discharge specific capacity and the best cycle stability with a discharge specific capacity of $282 \text{ mAh}\cdot\text{g}^{-1}$ at $100 \text{ mA}\cdot\text{g}^{-1}$. In the meantime, the discharge specific capacity of commercial $\beta\text{-Ni}(\text{OH})_2$ was $270 \text{ mAh}\cdot\text{g}^{-1}$. When the sample CoOOH=5% was cycled at $800 \text{ mA}\cdot\text{g}^{-1}$, the discharge specific capacity did not decrease for 30 cycles, whilst other samples containing Co and commercial $\beta\text{-Ni}(\text{OH})_2$ showed different degrees of discharge specific capacity. Several experimental results proved that the sample with CoOOH mass fraction of 5% had good multiplier property and could improve the cycling stability of nickel electrode.

Keywords: Chemical coprecipitation method; Coating; Rate capability; Cyclic stability

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