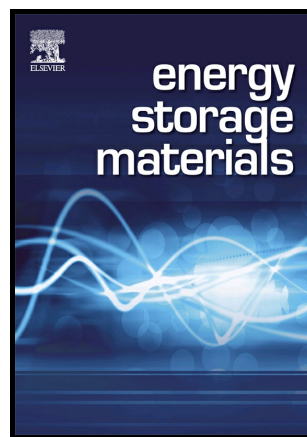


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Non-noble Metal-Transition Metal Oxide Materials for Electrochemical Energy Storage

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Most transition metal oxides (TMOs) with medium conductivity and large volume expansion upon lithiation have a relatively poor rate capability and cycling life. To improve the electrochemical performances of electrochemical energy storage devices (EESDs), low-cost non-noble metals can be coupled to TMOs to yield diversified nanostructures, such as non-noble metal decorated-TMO nanoparticles (NPs) or nanoarrays, non-noble metal-TMO core-shell nanostructures. Notably, in recent years, conductive metal (Cu, Ni, Ti) substrates have been effectively employed as current collectors for the direct growth of TMO nanostructures, which have attracted much attention. Thus, non-noble metal-TMO materials can be divided into three types: 1) TMOs on non-noble metal substrates (TMO/NM-S), 2) non-noble metal-TMO (NM/TMO), 3) non-noble metal-TMO on substrates (NM/TMO/S). In this review, we focus on the three types of non-noble metal-TMO materials based on their synthetic methods, morphologies and electrochemical performances for supercapacitors and rechargeable batteries. Furthermore, future perspectives and challenges of non-noble metal-TMO materials for EESDs are briefly discussed.

Keywords: non-noble metal (substrate); transition metal oxide; supercapacitor; rechargeable battery

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