MoO₂ nanoparticles anchored on hierarchical carbon architectures for fast K-ion storage

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Monodisperse spherical architectures consisting of MoO₂ nanoparticles and polydopamine-derived carbon matrices are designed and successfully synthesized. X-ray diffraction revealed that the MoO₂ nanoparticles are crystalline state whereas the carbon matrices are amorphous. The hierarchical morphology is confirmed by scanning electron microscope and transmission electron microscope. Electrochemical characterizations demonstrate that the composite can achieve fast K-ion storage, which enable its potential application in K-ion batteries. For optimizing the synthesis condition, different calcination temperatures are adopted. The sample synthesized at 500 °C exhibits the highest capacity in K-ion storage, as well as the best rate capability. Furthermore, study on the kinetics of electrode process reveals that the unique architecture shows significant capacitive behavior, verifying the fast K-ion storage capability.

Keywords: Energy storage and conversion; Nanocomposites; Molybdenum oxide; hierarchical; potassium-ion batteries

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