3D-flower MoS₂/Polyimide Heterostructures with Enhanced Electrochemical Properties for Lithium Storage

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3D-flower MoS₂/polyimide heterostructures (MoS₂/PI) with a size of 0.71 nm have been successfully synthesized through a hydrothermal and carbonization method; the above method uses water-soluble polyimide as a precursor because it contains desirable interlayer spacing and nitrogen-doped carbon. When used as anode materials in lithium-ion batteries (LIBs), the obtained nanostructures present good rate capability (226 mA h g⁻¹ at 5 A g⁻¹) and superior cycling stability (490.7 mA h g⁻¹ at 1 A g⁻¹ over 300 cycles). We conclude that the good performance of the MoS₂/PI composite can be attributed to the high content of nitrogen doping and the abundant voids caused by the enlarged interlayer spacing of the heterostructures, both of which can buffer volume changes and create additional active sites for the LIBs. This work demonstrates that the obtained heterostructures hold great potential for high-performance energy storage applications.

Keywords: Anode materials, MoS₂, Polyimide, Nitrogen Doping, Interlayer spacing, Lithium-ion batteries

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