Preparation and Electrochemical Properties of Bamboo-based Carbon for Lithium-Ion-Battery Anode Material

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In this study, we use bamboo as a raw material and KOH as an activator to prepare a bamboo-based carbon anode material for use in lithium-ion batteries by applying the microwave radiation method. The crystal structure and morphology of the prepared material are characterized by X-ray diffraction and scanning electron microscopy, respectively, and the electrochemical performance of the material is characterized by galvanostatic charge–discharge and cyclic voltammetry. The results demonstrate that the bamboo-based carbon material can be used as an anode material with high electronic and ionic conductivity in LIBs. The initial charge and discharge capacities of the bamboo-based activated carbon material at 0.5 C range up to 961.4 and 2071 mA·h·g⁻¹, respectively. The first charge and discharge Coulombic efficiency is only 46.4%, and after 100 cycles, the circulation charge and discharge capacities remain at 721.8 and 737.3 mA·h·g⁻¹, respectively. Overall, the efficiency remains above 97.8%, which demonstrates the excellent cycling stability of the bamboo-based carbon material. The sample shows good rate performance and excellent cycle stability because of the large specific surface area, which can improve the permeability of electrolyte, increase the reactive sites, and improve the electrochemical performance.

Keywords: Bamboo; Lithium-ion battery; Carbon materials; Microwave radiation; Electrochemical properties

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