Preparation and Electrochemical Properties of Lignin Porous Carbon Spheres as the Negative Electrode of Lithium Ion Batteries

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There is a large amount of lignin in the black liquor of papermaking, which can be made into carbon material and applied to the negative pole of lithium ion battery. It can not only make rational use of resources, but also reduce environmental pollution. The relationship among pore size, specific surface area and pore distribution of carbon materials are studied. Porous carbon materials were synthesized by self-assembly and high-temperature calcination. By constructing porous carbon spheres and changing the morphology, the anode materials of lithium ion batteries with large specific surface area and high specific capacity can be obtained. Raman spectrum shows that graphite structures are in porous carbon spheres. BET results show that porous carbon spheres have a large specific surface area (525.0-867.8 m²/g). The sulfur element in lignosulfonic acid can also improve the performance of the electrode. The results of constant current charging-discharging show that the specific capacitance of the samples in the first charge and discharge is 904.3 mAh/g and the unit capacitance of the porous carbon material is 557.9 mAh/g after 50 charging-discharging times when the current density is 1.0 A/g.

Keywords: Lignin, Porous carbon, Sol-gel method, Electrochemical properties

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