Nitrogen-Doped Carbon Microspheres as Superior Electrode Materials for Energy Storage Applications

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There has been a steady increase in demand for clean and efficient energy storage devices due to the ever-rising concerns about limited global energy supply, environment impact and climate changes. Recently, electrical double layer supercapacitors (EDLC) and lithium ion batteries (LIBs) have been extensively used in portable electronic devices due to their high power density, long cycle life, lightweight and high energy density. [1-4]

Figure 1. (a) Illustration of the synthesis route for NCMS and ANCMS, (b) SEM image of NCMS, (c) N2 adsorption/desorption isotherms at 77 K of NCMS and ANCMS, (d) SEM image of ANCMS.

Herein, we reported the preparation of nitrogen-doped carbon microspheres (NCMS, Figure 1a, b) and activated nitrogen-doped carbon microspheres (ANCMS, Figure 1d). [5] The porous structure of ANCMS gives rise to a relatively high Brunauer-Emmett-Teller specific surface area of 1303 m² g⁻¹ and total pore volume of 0.44 cm³ g⁻¹. The obtained ANCMS have excellent properties, such as high electrical conductivity, large specific surface area and unique pore-size distribution. Furthermore, the nitrogen doping can improve the capacitance behavior in EDLC and have an effect on sulfur reduction in lithium-sulfur batteries. ANCMS are a promising candidate for energy storage applications such as EDLC and lithium-sulfur batteries.

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