Hydrangea-like Mesoporous Carbon Architectures Embedded with MnO_x Nanoparticles for Solid-State Asymmetric Supercapacitors with Enhanced Areal Capacitance

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Hydrangea-like mesoporous carbon architectures embedded with MnO_x nanoparticles (MnO_x@C) are synthesized *via* the pyrolysis of Mn-MOFs (Mn-based metal organic frameworks) grown on nickel foam as a binder-free electrode for asymmetric supercapacitors. The as-prepared MnO_x@C featuring stacked carbon flakes with mesoporous structure and embedded with nanosized MnO_x particles exhibit superior electrochemical performances with a specific areal capacitance of 1518 mF cm⁻² at a current density of 3 mA cm⁻². An asymmetric supercapacitor that is fabricated using MnO_x@C as cathode and activated carbon as anode demonstrates remarkable areal power density of 12.2 W cm⁻², areal energy density of 169.4 mWh cm⁻² and excellent rate capability. This work provides a facile and effective strategy to construct MnO_x@C supercapacitive materials so as to efficiently enhance electron transport at the meantime achieve rapid ion diffusion.

Keywords: metal organic frameworks, mesoporous carbon, manganese oxide, binder-free electrodes, asymmetric supercapacitors

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