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Hierarchical Porous Carbon with Network Morphology Derived from Natural Leaf for Superior Aqueous Symmetrical Supercapacitors

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Abstract: Development of efficient, low-cost and high-performance carbon materials as the electrodes is of significance for supercapacitors. Here we report a new class of hierarchical porous carbon with a three-dimensional network morphology of interconnected nanoparticle units prepared by using natural *Indicalamus* leaves and polytetrafluoroethylene as carbon precursor and silica-*in-situ*-remover, respectively. This protocol allows for successful post-treatment-free synthesis of biomass-based hierarchical porous carbon with specific surface area as high as 1801 m^2/g without any extra activation process. Accordingly, when used as the electrodes of aqueous symmetrical supercapacitor, the as-prepared carbon material demonstrates superior capacitive behaviors, including high capacitances of 326 and 211 F/g in 1.0-V and 1.8-V supercapacitors, respectively, high energy density of 23.7 Wh/kg at power density of 224.5 W/kg, and excellent cycling stability. With these extremely attractive capacitive properties, this class of hierarchical porous carbon outperforms many typical state-of the-art carbonaceous electrodes.

Keywords: carbonaceous porous network; hierarchical structure; aqueous electrolyte; symmetrical

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