Hierarchical Porous Carbon Microspheres Derived from Biomass-Corncob as Ultra-High Performance Supercapacitor Electrode

Lili Wang¹, Yanting Li¹, Kunlong Yang¹, Wenqi Lu¹, Jianguo Yu¹, Jian Gao¹, Gang Liao¹, Yuning Qu^{1,*}, Xiaofeng Wang², Xifei Li³, Zhen Yin^{1,*}

¹ State Key Laboratory of Separation Membranes and Membrane Processes, School of Environment and Chemical Engineering, Tianjin Polytechnic University, 399 Binshui West Road, Tianjin 300387, P. R. China

² State Key Laboratory of Inorganic Synthesis and Preparative Chemistry, College of Chemistry, Jilin University, Changchun 130012, P. R. China

³ Tianjin International Joint Research Centre of Surface Technology for Energy Storage Materials, College of Physics and Materials Science, Tianjin Normal University, Tianjin 300387, P. R. China

*E-mail: qu_yuning0323@163.com, yinzhen@tjpu.edu.cn

doi: 10.20964/2017.06.16

Received: 9 March 2017 / Accepted: 28 March 2017 / Published: 12 May 2017

The hierarchical porous carbon microspheres (HPCS) were obtained using corncob as precursor via a facile and cost-effective approach. The porous carbon microspheres exhibited regular spherical morphology, hierarchical porous, localized graphitization structure and the oxygen-containing functional groups on the surface of carbon spheres. The pore size and specific surface area could be tuned by the amount of KOH during the activation process. The porous carbon microspheres displayed maximum specific capacitance of 384.5 F/g at scan rate of 5 mV/s and ultra-high rate capacitance of 137.3 F/g at the current density of 100 A/g. The high capacitance retention of the porous carbon microspheres (over 97%, even with 5000 charge/discharge cycles) demonstrated its superior cycling stability. Moreover, high power density (62.9 kW/kg) and energy density (33.4 Wh/kg) could be achieved at 120 A/g. Hence, the ultrahigh specific capacitance and exceptional cyclic stability of the porous carbon microspheres indicate its significant potential application in the field of energy storage.

Keywords: Biomass, Carbon microspheres, Hierarchical pore, Supercapacitors

[FULL TEXT](#)

© 2017 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).