



A Novel Plug-and-Play Coaxial Microfluidic Device and Preparation of Hierarchical Porous Carbon Microspheres

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Abstract:

Carbon microspheres with macro-meso-microporous hierarchical pore has increasingly become a subject of great interest, driven by the need to obtain high performing carbons in multidisciplinary fields, such as lithium battery materials, catalyst carriers, capacitor electrode materials, adsorption materials and drug delivery. Numerous methods like arc discharge, hydrothermal, chemical vapor deposition and template are generally chosen to prepare carbon microspheres. However, these methods has poor experimental repeatability and wide particle size distribution. Notably, the droplet-based microfluidic technique is useful for the generation of various uniform microparticles, reducing the experimental errors and ensuring stability and quality. To prepare uniform particles, we developed a novel plug-and-play coaxial microfluidic device. The capillary device was based on commercial components that can readily be assembled, adjusted and cleaned. In this device, regardless of surface wettability of fluidic channel, monodisperse droplets with average diameter in the range of 50-800 μm could be controllably prepared. This design strategy allows for generation of various granular material and simplifies the fabrication process to meet different conditions during preparation, which would be an attractive tool in the future. By radical polymerization and two-phase shear flows in the microchannel, a three-dimensional network structure of light-cured spherical gel was formed. After high-temperature carbonization and activation, hybrid resin transformed to carbon and spherical carbon particles with well-balanced pore distribution and uniform size were obtained. Comparing the characterization results of various activation, it shows that carbon microspheres



Biography:

Dr. Li Zhang is a professor at East China University of Science and Technology. Her research focuses on microfluidics, heat transfer enhancement technology and advanced manufacturing of energy materials. She has published more than 50 papers in reputed journals at home and abroad.

Recent Publications:

- Li Zhang, Science. 2020
- Li Zhang, Lab Invest. 2020
- Li Zhang, Cell Host Microbe. 2020
- Li Zhang, Clin Infect Dis. 2020
- Li Zhang, J Cell Biochem. 2019

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