The Large-Scale Production of Fibrous Carbons and Their Applications

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The sp2-based fibrous carbons, such as carbon nanofibers, multiwall carbon nanotubes and single-wall carbon nanotubes, are viewed as excellent nanomaterials, with high potential for applications in various fields of nanotechnology, due to their extraordinary chemical and physical properties. One obstacle to the recent trend toward widespread practical applications of fibrous carbon is considered to be the difficulty of large-scale production of high-purity fibrous carbons at low cost. In this context, the catalytic chemical vapor deposition method is considered to be the key to the large-scale production of these fibrous carbons, particularly with the use of a floating reactant method. Through exact control of the synthesis conditions, it is possible to tailor the diameter, crystallinity, and angle of truncated cones with regard to the tube axis. In this study, we will report the synthesis method of fibrous carbons including SWNTs, particularly including the floating reactant method, describe structural characterizations for various fibrous carbons, and finally consider various practical applications for these fibrous carbons, such as a filler in advanced nanocomposites, electrochemical applications, and field emitters.

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