

Carbon Fiber with Uniform Pore Size

VTIP 17-074: “Porous Carbon Fiber from Block Copolymers”

THE CHALLENGE

Carbon fibers are used in a wide range of industries and applications including composites, catalysis, sensing, energy conversions and storage and membrane filtration. One approach to make carbon fibers utilizes electrospinning of block copolymers. However, due to challenges associated with the technique, it can be difficult to produce carbon fibers of uniform pore size, which significantly advances the carbon fiber chemistry.

OUR SOLUTION

The current invention describes a strategy to produce porous carbon fibers from block copolymers such as poly(acrylonitrile-*b*-methyl methacrylate) (PAN-*b*-PMMA). The porous carbon fibers produced with this approach have hierarchical micro-meso-macro-porous structures and well-controlled pore sizes. Compared to other approaches blending PAN with sacrificial homopolymers or other approaches, the approach of using PAN-containing block copolymers as carbon precursors represents a powerful means to hierarchically porous carbon fibers with highly uniform pores. This improvement will greatly aid mechanical structure and propagation of mass transport.

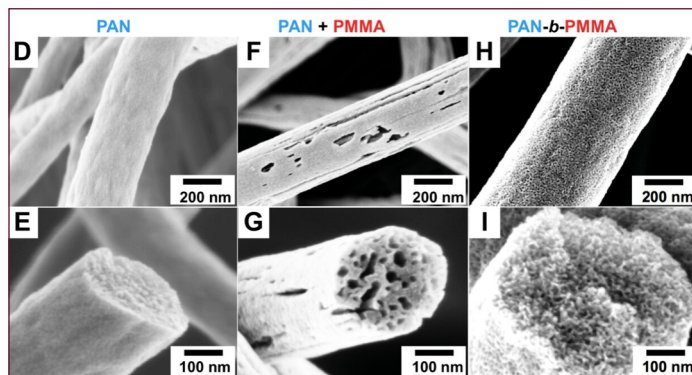
https://www.eurekalert.org/pub_releases/2019-02/vt-pcf021419.php

<https://vtnews.vt.edu/articles/2019/02/mii-using-block-copolymers-to-make-porous-carbon-fibers.email.html>

<https://vtnews.vt.edu/articles/2019/02/mii-porous-carbon-fiber-research-one-step-closer-automotive-industry-use.html>



An example image of energy conversion applications of carbon fibers.



A microscope image of porous carbon fibers produced with block copolymers.



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