

Electrospun zeolite-templated carbon composite fibres for hydrogen storage applications

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ABSTRACT:

The current study explored the application of the electrospinning technique to produce multi-hierarchical composites for hydrogen storage applications. Predetermined control of fibre porosity is expected to enable production of well-defined hierarchical pore structure. The study involved encapsulation of highly porous zeolite-templated carbon (ZTC) into electrospun fibres and testing of the resulting composites for hydrogen storage. The hydrogen storage capacity of the composite fibres was 1.83%, compared with 2.39 wt% for powder ZTC material. The potential of the electrospinning technique as a shaping option for preparing composites from loose powder is demonstrated. The ZTC–polyacrylonitrile (ZTC-PAN) composite retained about 76% of the hydrogen storage capacity of the ZTC. Vacuum degassing of the ZTC–PAN electrospun composite was also found to enhance the development of porosity, aiding hydrogen penetration into zeolite pores.