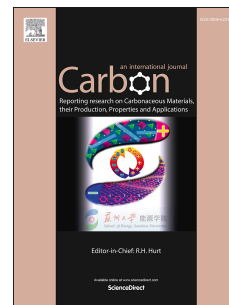


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Ultrafast Sol-Gel Synthesis of Graphene Aerogel Materials

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Abstract

Graphene aerogels derived from graphene-oxide (GO) starting materials recently have been shown to exhibit a combination of high electrical conductivity, chemical stability, and low cost that has enabled a range of electrochemical applications. Standard synthesis protocols for manufacturing graphene aerogels require the use of sol-gel chemical reactions that are maintained at high temperatures for long periods of time ranging from 12 hours to several days. Here we report an ultrafast, acid-catalyzed sol-gel formation process in acetonitrile in which wet GO-loaded gels are realized within 2 hours at temperatures below 45°C. Spectroscopic and electrochemical analysis following supercritical drying and pyrolysis confirms the reduction of the GO in the aerogels to sp^2 carbon crystallites with no residual carbon–nitrogen bonds from the acetonitrile or its derivatives. This rapid synthesis

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