

Partially Ordered SWCNT-pillared Nanographene Films

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Nanographenes can offer a promising route for production of well-designed porous carbons which provide high adsorption or separation selectivity with excellent stability through controlled pore structure and sample morphology, being requested for next-generation molecular separation and energy materials applications¹⁻³. It is necessary to develop robust nanoporous adsorbents and/or membranes of an optimum flexibility.

In this work, we prepared the SWCNT-pillared nanographene films of tunable porous structure and high electrical conductivity, although there are no concrete SWCNT-pillared graphenes evidenced by the diffraction method regardless of several publications. Completion of pillaring of hydrophobic SWCNT in highly hydrophilic precursors i.e. graphene oxide layers, requests surface modification of de-bundled SWCNT⁴. We prepared the SWCNT-pillared nanographene films using partially oxidized SWCNTs by air oxidation at 823 K. The porosity of the obtained SWCNT-nanographene film from N₂ adsorption is as follows: the SPE surface area; 530 m²g⁻¹, pore size distribution having peaks at 0.7 nm and 3.4 nm. Sheet resistance of 5-20 Ω/sq. The X-ray diffraction indicates the pillared structure formation by the sharp peak at 2.9 nm of interlayer distance corresponding to the graphene-SWCNT-graphene stacking structure. Raman spectroscopy also indicates that the crystallinity is improved by the pillaring treatment.

References:

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