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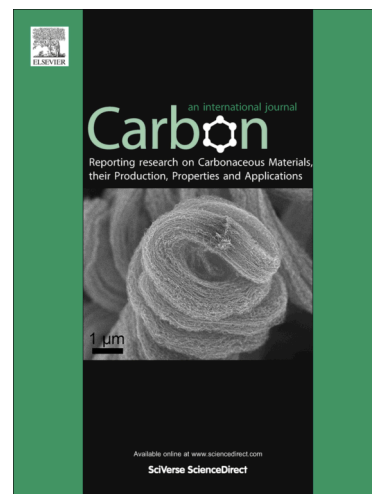
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Nitrogen Ion Casting on Vertically Aligned Carbon Nanotubes: Tip and Sidewall Chemical Modification

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Abstract

Nitrogen inclusion in vertically aligned carbon nanotubes (v-CNTs) was performed *in-situ* and in ultra-high vacuum by nitrogen ion implantation and evaluated by X-ray photoelectron spectromicroscopy. The creation of defects induced by the ions drives the formation of different nitrogen species (pyridinic, pyrrolic, and graphitic) at the CNT surface. While nitrogen implantation in CNT sidewalls has results similar to implantation in graphene, where mainly nitrogen sp^2 bonding configuration occurs, we observed a different behaviour at the CNT tips, where nitrogen incorporation is also more efficient. A large amount of pyrrolic nitrogen is observed at the CNT tips compared to the amount at the CNT sidewalls for the same ion implantation parameters. This indicates a different reactivity of the CNT tips where the presence of natural defects may be involved in different nitrogen bonding formations between carbon and nitrogen with respect to the CNT sidewalls.

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