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Iron coated ZnO nanorods catalysed growth of carbon nanostructures

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Abstract content
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The growth of carbon nanostructures (CNs) on vertically aligned zinc oxide nanorods (ZnO NRs) was investigated, using bare and iron coated ZnO NRs as the catalysts. The chemical vapour deposition (CVD) temperatures of 580 and 630 degree Celsius were used to synthesis the CNs. The CNs/ZnO hybrids were characterised by ex-situ scanning electron microscopy and in-situ X-ray and ultraviolet photoemission spectroscopy. The carbon nanostructures grown directly on the bare ZnO NRs changed from an amorphous graphitic carbon coating at 580 degree Celsius to a nanostructured carbon coating with the NRs partially etched at 630 degree Celsius. The carbon nanostructures grown with the aid of a Fe catalyst changed from vertically oriented on the NRs tips at 580 degree Celsius to dense and randomly oriented CNTs at 630 degree Celsius with the NRs completely etched. The etching of the NRs with acetylene chemical vapour deposition was observed to increase with the increasing temperature and was accelerated by the presence of the Fe catalyst allowing for the complete etching of the NRs at lower temperatures when an Fe catalyst was used. By growing the carbon nanostructures with the aid of an Fe catalyst we have grown a new hybrid structure of CNTs and nanostructured porous carbon.

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no

Level for award (Hons, MSc, PhD)?

n/a

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yes

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