Pretreatment effects on the lengths and diameters of carbon nanotubes

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Abstract: We have investigated the pretreatment effects on the lengths and the diameters of carbon nanotubes (CNTs) grown on a Ni catalyst by using dc plasma-enhanced chemical-vapor deposition system. The average sizes of the Ni particles changed with the cathode bias during the pretreatment, with the minimum value at a cathode voltage -100 V. The diameters of the CNTs followed the size of the Ni particles. In the cathode voltage range from -100 V to -600 V, the average diameter of the CNTs changed from 31.7 nm to 66.5 nm with increasing Ni sizes. The plasma power and the pretreatment time should be optimized to control the diameters of vertically-aligned CNTs. Also, N_2 is added in NH_3 during the pretreatment, the lengths and the densities of the CNTs can be controlled.

Author Keywords: Carbon nanotubes; DC-PECVD; Diameter; Length; Pretreatment

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