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Effects of catalytic gases on the synthesis of carbon nanotubes

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We have researched the relationship between plasma characteristics and growth of CNTs in various catalytic gases. The well aligned multi-wall carbon nanotubes(CNTs) were synthesized on the Ni coated Si(100) by hot filament plasma enhanced chemical vapor deposition(PECVD) with gas mixture of C_2H_2 as a carbon source and NH_3 as a catalytic gas, which are usually used for synthesis of CNTs at PECVD system. The CNT growth was performed at a temperature of approximately $650^{\circ}C$ and a DC plasma power of approximately 100W. When the reaction gas is only C_2H_2 , CNTs could not be synthesized. For changing the plasma characteristics, catalytic gas was used NH_3 , N_2 , or H_2 . The synthesized CNTs were investigated their structure by high resolution transmission electron microscopy and chemical species by optical emission spectroscopy. The grown CNTs were different in length and diameter by different catalytic gases.