331a Comparison of Single Wall Carbon Nanotube Growth on Ni Incorporated MCM-41 by Different Carbon Sources

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We report the chemical vapor deposition growth of single wall carbon nanotubes (SWNT) using carbon monoxide, methane, and ethanol as the carbon source and Ni incorporated MCM-41 as the catalyst. Diameter distribution of SWNT resulting from these three carbon sources under identical reaction conditions was compared. The Ni-MCM-41 catalyst was studied by TEM and X-ray absorption spectroscopy (XAS) after SWNT growth. We have found the carbon sources have different affinities for Ni atoms in MCM-41 amorphous silica matrix, which leads to distinct nucleation rates of Ni clusters during SWNT synthesis, resulting in Ni clusters with various sizes. Different Ni clusters lead to growth of SWNT with different diameter distributions. This result implies that it is important to selectively match the carbon source and the metallic component in the catalyst to achieve a better control on SWNT structure.