

331f Microscopic Analysis of Swnt Grown on Co-Mo Catalysts Supported on a Tem Grid

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Over the last few years our group has focused on the production of single-wall carbon nanotubes (SWNT) by disproportionation of CO on bimetallic CoMo catalysts, which exhibited a high selectivity toward the production of SWNT at relatively low temperatures. This good performance has been linked to the interaction between Co and Mo that form a surface cobalt molybdate species, which is the precursor of the active species that under reaction conditions becomes Mo carbide and small clusters of metallic Co, which are responsible for the growth of SWNT. To better investigate the growth process model catalysts have been prepared by depositing CoMo bimetallic particles on lacey silicon monoxide grids and growing SWNT from CO and CH₄ feeds as carbon source. Our preliminary results show that in the case of the CO feed the SWNT growth needs an induction period before a high density of long SWNT is quickly produced. These observations are in agreement with Raman studies performed on the same materials. No carbon signal appears during the first few minutes, despite a strong modification in the spectrum region associated with the Co-Mo species. The typical bands characteristic of SWNTs, start appearing only after 3 minutes in contact with CO and become very strong after 10 minutes under reaction. When CH₄ was used as carbon source, SWNTs were detected after exposure to CH₄ for 5 minutes. However, as observed by TEM, the yield of SWNTs is much lower than that produced by CO even after the same time exposure. The crystal structure of the metal catalyst after reaction with CO and CH₄ is also different. These observations can lead to a more detailed understanding of the growth mechanism.