APS March Meeting 2016

Monday–Friday, March 14–18, 2016; Baltimore, Maryland

Session A27: Carbon Nanotube & Related Materials: Growth, Separation, and Assembly

8:00 AM–11:00 AM, Monday, March 14, 2016

Room: 326

Sponsoring Unit: DMP

Chair: Zhihong Chen, Purdue University

Abstract ID: BAPS.2016.MAR.A27.5

Abstract: A27.00005 : Growth of Single-Walled Carbon Nanotubes by High Melting Point Metal Oxide Catalysts

9:12 AM–9:24 AM

Preview Abstract *MathJax* ***On*** | *Off* ← *Abstract* →

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We report on the growth of single-walled carbon nanotubes (SWNTs) from Co oxide catalysts. The concept is using the relatively lower mobility of metal oxide (than metal) to suppress catalyst aggregation at high temperatures. Compared to the SWNTs grown by pre-reduced catalysts, SWNTs grown from oxidized Co catalysts have shown narrower diameter distribution and smaller average diameter. Different growth parameters are discussed regarding the resulting morphology of SWNTs. Transmission electron microscopy (TEM) investigations reveal the information that Co catalysts are transformed to Co3O4 after reduction-calcination process. X-ray photoelectron spectroscopy (XPS) investigations indicate that Co3O4 has decomposed to CoO before growth at a typical growth temperature (800 ºC) in Ar atmosphere. We propose that CoO has higher melting point than Co and thus is more stable during the growth. Our results indicate that besides the bimetallic catalysts, monometallic catalytic system could also be useful in stabilizing the catalysts to grow chirality-specific SWNTs by transforming the relatively low melting point metal catalysts to high melting point metal oxide catalysts.

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