

Floating Catalyst CVD Growth and Dry Deposition of SWCNTs for Thin Film Applications

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日時: 2012年3月27日(火) 9:30 - 10:10

会場: 東京大学工学部2号館 3F 31A会議室

要旨

We start by reviewing the recent progress in the field of chirality controlled synthesis of SWCNTs by chemical vapor deposition, both supported and floating catalyst methods. Then we present our recent results on SWCNT direct, dry deposition from the floating catalyst reactor at ambient temperature and pressure to manufacture transparent thin film conductors and field effect transistors (TFT). Flexible SWCNT-PET conducting films show transparency-sheet resistance properties similar to those of ITO-PET films. SWCNT network TFTs on both silicon as well as polymeric substrates show mobilities of 35 cm²/Vs and on/off ratio of 5*10 to 6. Also, we developed free standing SWCNT films for various applications. To further control the tube properties, we have carried out studies on SWCNT growth from carbon monoxide (CO) using supported CVD methods. When using supported bimetallic Fe-Cu catalysts, very narrow chiral distribution SWCNTs were produced. In addition, epitaxial formation of cobalt (Co) nanoparticles via CoxMg1-xO solid solution reduction in CO enables to grow SWNTs with a narrow diameter distribution. In situ environmental Cs-corrected transmission electron microscopy (ETEM) studies reveal that the Co nanoparticles remain in metallic state and their epitaxial contact with MgO support remains coherent during SWNT growth process.



主催: 東京大学グローバルCOEプログラム「機械システム・イノベーション国際拠点」
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