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VABILO NA PREDAVANJE
INVITATION TO THE LECTURE

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Velika predavalnica Kemijskega inštituta
Lecture Hall at the National Institute of Chemistry
Hajdrihova 19, Ljubljana

Nanocarbons for Thin Film Flexible Electronics Applications

We present the synthesis of the high quality single walled carbon nanotubes (SWCNT) as well as discuss their formation mechanisms during floating catalyst CVD synthesis from CO at ambient pressure and at temperature range 800-1100 ^{o}C using iron nanoparticle catalyst. We discuss the effect of reactor operating temperature on the individual tube as well as bundle length and their diameter distributions, being determined both by electron microscopic as well as optical methods. Especially, we discuss the control of tube chirality distributions via introducing trace amounts of CO_2 and NH_3 into the reactor. Also, we present the novel nanocarbon material, carbon nanobud (CNB), combining fullerene molecules covalently bonded onto the outer surface of SWCNTs. We present recent findings to use ALD-deposited mono and bi-metallic catalysts for the low temperature CVD synthesis of narrow chirality distribution SWCNTs from CO.

Methods for SWCNT as well as CNB dry deposition at ambient temperature to manufacture transparent thin conductors, cold electron field emitters, sensors and field effect transistor (TFT) with high carrier mobility as compared to organic semiconductors as well as transparent and flexible thin film conducting electrodes (TCE). These methods are based on floating catalyst, high temperature CVD synthesis of high quality SWCNTs from CO using Fe nanoparticle catalyst followed by SWCNT ambient temperature, direct, dry deposition onto the substrate. Flexible SWCNT-PET conducting films show transparency-sheet resistance properties similar to ITO-PET films. SWCNT network TFTs on both silicon as well as polymeric substrates exhibit mobilities above 20 cm^2/Vs and on/off ratio of 106.

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