

# Co-Cu powders for the production of complex carbon nanostructures: Multiwalled Carbon Nanotubes Decorating Wrinkled Carbon Belts

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## Abstract.

Multiwalled carbon nanotubes (MWCNTs) decorating wrinkled carbon belts (WCB) were grown on Co-Cu foils by means the chemical vapor deposition method using as precursor a solution based on a mixture of benzylamine, ethanol, and thiophene. Foils fabricated with Co-Cu powders mixed (10:1), ball milled during 1 h and pressed at 10 t were used as catalyst. The samples were characterized by transmission electron microscopy, Scanning electron microscopy, termogravimetric analysis, Raman spectroscopy, X-ray diffraction and surface area and cyclic voltammetry was employed to study their morphology and chemical properties. MWCNTs of ~45 nm diameter grown on graphitic belt structure with dimension of ~ 5  $\mu\text{m}$  width, and 0.36  $\mu\text{m}$  thickness and lengths of 140  $\mu\text{m}$ . Also Cu-NPs are distributed over the belt structure. XRD patterns revealed the typical (002) crystallographic plane attributed to graphite materials. Raman spectra showed the D- and G-band peaks with an intensity ratio of  $I_D/I_G = 1.1$  indicating the presence of defected graphite materials. The growth mechanism, electrochemical and magnetic properties are discussed.

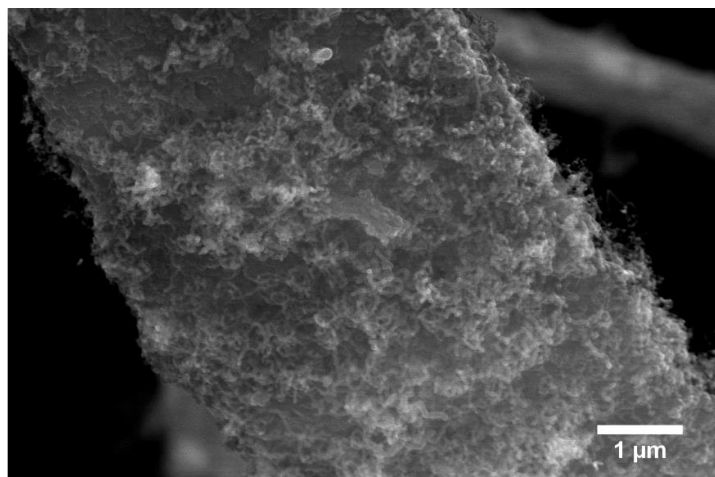


Figure 1: MWCNT grown over WCBs using Co-Cu catalyst.