

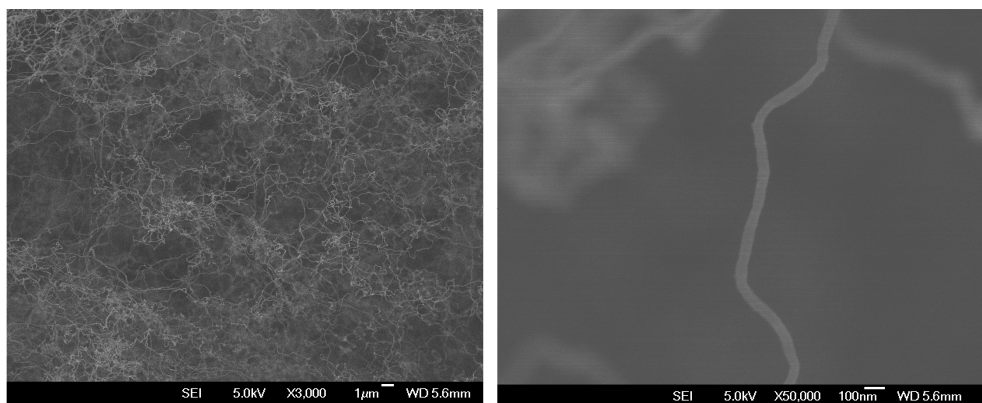
Synthesis and characterization of inorganic nanotubes and fullerenes-like nanoparticles

H. J. Ceragioli¹, V. Baranauskas and A.C. Peterlevitz
Faculdade de Engenharia Elétrica e Computação
Departamento de Semicondutores, Instrumentos e Fotônica
Universidade Estadual de Campinas

* Corresponding author, email: helderjc@gmail.com

Abstract- Nanoparticles of inorganic layered compounds, like MoS₂, are unstable in planar form. The purpose of this work is to investigate a method of synthesis of inorganic nanotubes and fullerene-like nanoparticles from chemical vapor deposition (CVD) process and mineral oil.

Carbon fullerenes and nanotubes are stable and form zero and one dimensional structures, respectively. In recent years, fullerenes-like (IF) structures and nanotubes have been made using numerous compounds with two layers dimensional structures, such as MoS₂, which are unstable in planar form [1]. The purpose of this work is to investigate a method of synthesis of inorganic nanotubes and fullerenes-like nanoparticles from combined chemical vapor deposition (CVD) process from mineral oil and camphor diluted in acetone, hydrogen and high concentration of nitrogen. The oil was MolykoteA2 that is a stable suspension of particles of molybdenum disulfide (MoS₂) tiny in neutral mineral oil. Silicon substrates have been used. After cleaning, the substrates have been coated with MolykoteA2. In the sequence, the samples were immersed in the reaction chamber of a hot-filament CVD system fed with a mixture of camphor and acetone diluted in hydrogen (15 % vol.) and nitrogen (85 % vol.). A total flow rate of about 100 sccm, regulated by precision mass flow meters, and a total pressure of about 20 Torr were maintained throughout. The deposition temperature was 773 K [2]. These parameters are discussed in relation to the morphological data obtained by Field emission scanning electron microscopy (FESEM), High resolution transmission electron microscopy (HRTEM), Energy dispersion x-ray spectroscopy (EDS) and results from Raman spectroscopy.



FESEM images of inorganic nanotubes with different magnification

References

- [1] Tenne R. and Rao C.N.R., *Phil. Trans. R. Soc. Lond. A*, (2004) 362, 2099-2155.
- [2] Ceragioli, H. J. ; Peterlevitz, Alfredo Carlos ; Quispe, J. R. ; Sampaio, Marcio ; Baranauskas, V. *Journal of Physics. Conference Series*, p. 1-4, 2008.