

## Single wall carbon nanotubes decorated with selenium nanoparticles

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### INTRODUCTION

The chemical manipulation of single walled carbon nanotubes (SWNTs), especially the side walls functionalization, has been an area of fundamental interest. Single walled carbon nanotube has opened a Pandora's box for new electronic devices nanostructured.<sup>1</sup>

Additionally, selenium exhibits a unique combination of many properties<sup>2</sup> as a relatively low melting point (~217°C), piezoelectricity, non-linear optical response and high reaction flexibility with a number of chemical compounds that enable the achievement of a broad class of compounds of selenium, as ZnSe and CdSe. In this context, the preparation of a new hybrid system employing one-dimensional selenium nanostructures (Se-1D) and carbon nanotubes can afford a very interesting system for technological applications. In a previous publication,<sup>3</sup> we have prepared a new selenium-carbon nanocable, employing a carbanionic intermediate species. This allowed an effective linkage between selenium and carbon nanotube sidewall, affording a covalent bond between this components.

### RESULTS AND DISCUSSION

To explore the potential of this reaction and the possibilities to interact selenium and carbon nanotubes, we describe here a new synthesis of SWNT decorated with selenium nanoparticles, using a weaker core-shell Van der Waals interaction, as showing in the figure 1. The nanohybrid material is composed of selenium nanowires and HiPco carbon nanotubes as a physical support. The resulting material was characterized using Raman spectroscopy and transmission electron microscopy (TEM). The results showed the new hybrid system as a carbon nanotubes coated with a layer of helical selenium nanowires interacting via a Van der Waals, as show in figure 1.

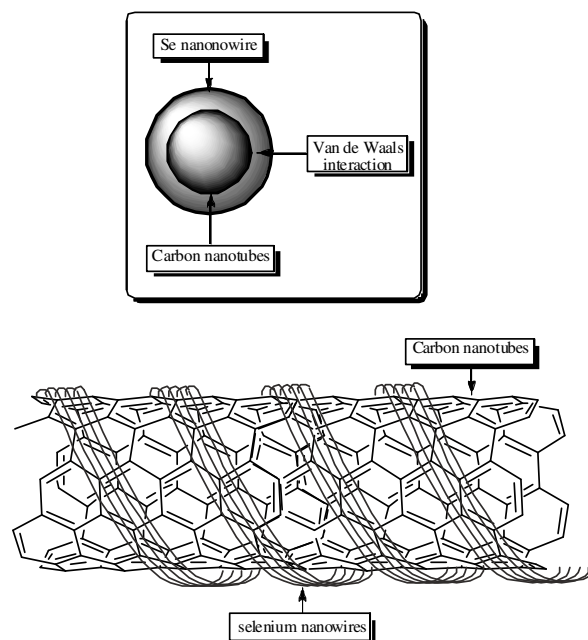


Figure 1. SWNT decorated with selenium nanoparticles

### CONCLUSION

In this work, we developed a new methodology for the preparation of single wall carbon nanotubes decorated with selenium nanoparticles. The preparation of new hybrid systems involving sulfur and tellurium are being completed in our research group.

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CAPES, CNPq, FAPERGS.

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