Modulating the electronic properties of synthetic carbon allotropes by chemical modification

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Carbon nanotubes and fullerenes have been extensively investigated due to their relevance in fields such as biomedicine and nanomaterials sciences. Particularly, their role as integrative building blocks in electron-donor-acceptor structures is already well-established, although these carbon nanostructures have mainly been considered as the acceptor counterparts.[1] Compared with empty fullerenes, endohedral metallofullerenes –filled with metallic clusters- and single-walled carbon nanotubes, have the advantage of a broader distribution of electronic states, which in certain cases can be reached under quite accessible experimental conditions.

In this contribution we will present our results in the preparation of electroactive carbon allotropes,[2-4] mostly considering their less explored electron-donor ability and, the role of the incorporated metals in the case of endohedral metallofullerenes. The solubilization of single wall carbon nanotubes (SWCNTs) by dendronized or ionic liquid units endowed with exTTF or TCAQ moieties has allowed their characterization by Raman spectroscopy, thermogravimetric analysis (TGA), steady-state UV-vis-NIR spectroscopy, transmission electron microscopy (TEM), or X-ray photoelectron spectroscopy (XPS). The characterization achieved and the properties of these new nanostructures will be presented and discussed.

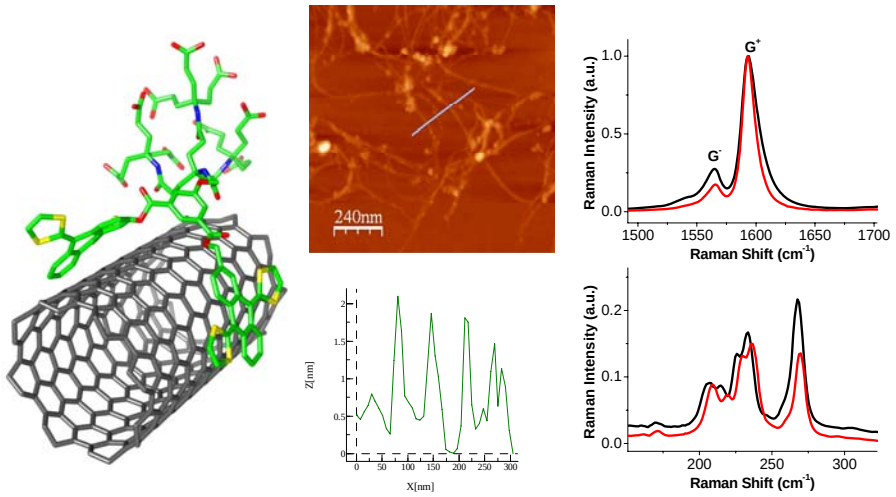

Figure 1. Water-soluble exTTF-based nanotweezer hybrids with single wall carbon nanotubes and representative AFM and Raman characterization.

References

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