OLIGORYLENE NANOGRAPHENES AND X-SHAPE MULTIRADICALOID MOLECULES: STRUCTURAL INSIGHTS FROM RAMAN SPECTROSCOPY.

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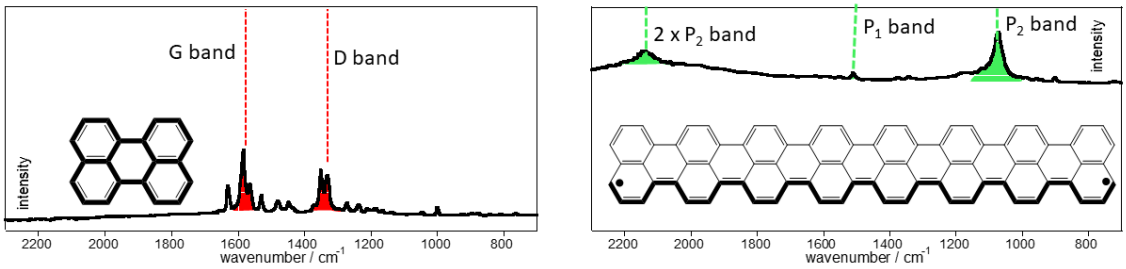
Raman spectroscopy has been the technique of choice for the structural study of carbonaceous materials, including graphitic substrates, carbon nanotubes, fullerenes, conducting polymers and graphene.[1] In the material science and organic chemistry communities, the most popular use of Raman spectroscopy in the case of graphene has been for the elucidation of the density of defects in relationship with the portion of intact material (benzenoid rings) through the analysis of the G and D Raman bands. Molecular versions of graphenes or nanographenes have become very interesting materials for a number of reasons.[2] For instance, nanographenes allow a molecular understanding of the spectroscopic properties of the infinite 2D sheet following a bottom-up approach. With this "oligomer approach", physical, structural and electronic properties are studied as a function of the nanographene size.

In this presentation, we will show an oligomer approach based on the rylene units by studying up to octarylene.[3] We will show how the Raman spectra of these oligorylene undergo a sudden transformation from typical G&D-type spectra to polyacetylene-type highlighting unexpected structural features that radically changes the "tiring" interpretation of the Raman spectra of nanographenes to a new and vivid vision.[4]

On the other hand, in the context of new 2D multiradicaloid molecular-based materials, we will show our latest approach to their building blocks by exploiting the concept of X-shape conjugation, pseudo-cross-conjugation or cross-conjugation.

A "cocktail" of all these ingredients, "sweetened" by Raman spectroscopy, is proposed.



Left: Raman spectrum of rylene with the G&D Raman pattern; right) Raman spectrum of octarylene with the polyacetylene-type spectrum

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References

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