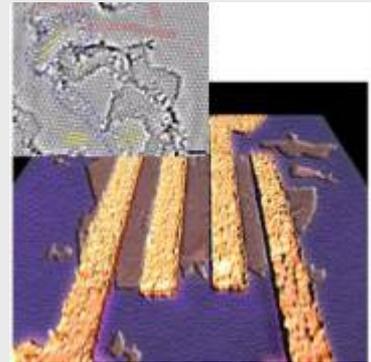


The influence of defects in the electrical transport properties of metalorganic nanoribbons and in the mechanical properties of suspended graphene flakes

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ABSTRACT:

In this talk I will briefly discuss two different topics related with the influence of defects in nanoscale systems [1,2]. The first one is related to the electrical transport properties of MMX nanoribbons. MMX compounds can be seen as one dimensional metal organic polymers that include a bimetal unit (MM can be Mo, Pt,...) and a linker that is usually a halogen. In our case we will focus on a MMX based on platinum and iodine as the linker. These compounds present a significant electrical conductivity that has been traditionally studied in macroscopic crystals. In this talk I will describe the synthesis [3] and electrical transport properties [4] of MMX nanoribbons, the influence of defects [5] in their conductivity and the transition between the nanoscale and macroscale regime. The second topic deals with the influence of induced defects in the mechanical properties of suspended graphene flakes. Using and atomic force microscopy we indent graphene flakes with different densities of defects. The experiments show an extreme drop of the breaking force with the irradiation dose and an unexpected increase of the Young modulus of the flake for low defect densities.

[1] Gomez-Navarro, C., P.J. De Pablo, J. Gomez-Herrero, B. Biel, F.J. Garcia-Vidal, A. Rubio, and F. Flores, *Tuning the conductance of single-walled carbon nanotubes by ion irradiation in the Anderson localization regime*. Nature Materials, 2005. 4(7): p. 534-539.

[2] Sundqvist, P., F.J. Garcia-Vidal, F. Flores, M. Moreno-Moreno, C. Gomez-Navarro, J.S. Bunch, and J. Gomez-Herrero, *Voltage and length-dependent phase diagram of the electronic transport in carbon nanotubes*. Nano Letters, 2007. 7(9): p. 2568-2573

[3] Welte, L., U. Garcia-Couceiro, O. Castillo, D. Olea, C. Polop, A. Guijarro, A. Luque, J.M. Gomez-Rodriguez, J. Gomez-Herrero, and F. Zamora, *Organization of Coordination Polymers on Surfaces by Direct Sublimation*. Advanced Materials, 2009. 21(20): p. 2025-2028.

[4] Welte, L., A. Calzolari, R. Di Felice, F. Zamora, and J. Gomez-Herrero, *Highly*

conductive self-assembled nanoribbons of coordination polymers. Nature Nanotechnology, 2010. 5(2): p. 110-115.

[5] Cristina Hermosa *et al.*, *Intrinsic electrical conductivity of nanostructured metal-organic polymer chains.* Submitted.