CoffeeTalk@ISOF

Graphene based molecular nanodevices

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Molecular scale materials are a promising resource for the development of functional devices. In particular spin-bearing molecules, the so called molecular magnets, may be used in a large range of possible applications, from nano-spintronics to quantum computing. The key challenge is how to address and exploit them in scalable device architectures. In this seminar, I will overview my research activity, focusing in particular on the most recent achievements, dealing with the use of graphene as a suitable template for embed and read out molecular spins in electronic circuits.
Several directions are currently pursued. Firstly, we develop graphene based electrodes which we employ to contact molecular units. By engineering the gap between the graphene electrodes in the nanometer range, we demonstrate charge transport through individual magnetic molecules, in a single-molecule (spin) transistor geometry. Alternatively, we use the graphene electrodes to contact atomically precise graphene nanoribbons, which represent the ultimate miniaturization of graphene devices with controllable edge properties and functionalities. The resulting "all-graphene" devices show potentialities for optoelectronic applications, including sensitive photo-detection in the UV-Vis range. Finally, I will show that graphene based electrodes are particularly appealing to be used to contact other low dimensional materials, in particular they show better performances than gold-made electrodes in short-channel organic field effect transistors employing perylene (PDIF-CN2) as the semiconductor.

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CNR Research Area
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