

"When Chemistry meets Nanoelectronics: Graphene, a new playground for Science and Innovation"

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Graphene is a two-dimensional monolayer of sp^2 bonded carbon atoms in a dense honeycomb crystal structure which behaves electronically as a zero-gap semiconductor with exceptional charge mobilities. However the engineering of innovative devices demand for the extensive use of chemical treatment to clean or functionalize the raw material.

This talk will overview some salient features of charge transport properties in chemically-doped or functionalized graphene based materials, with first the consideration of two-dimensional disordered graphene. In agreement with the 2D localization theory, the system will be shown to undergo a conventional 2D Anderson transition in the low temperature limit, providing inter-valley scattering processes are allowed, or say differently provided the material is sufficiently damaged. The sensitivity of localization phenomena in regards to edge symmetries and change of transport dimensionality or disorder scale will be further outlined [3]. The effect of chemical disorder, including Boron and Nitrogen substitutions, topological defects, vacancies and grafted molecules will be also discussed [4]. Chemical modifications of graphene material will be demonstrated to strongly impact on electronic properties of graphene, opening in some situation genuine perspectives for improved device performances and horizons for a carbon based nanoelectronics.

References

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