Seminario

Scanning tunnelling microscopy as ideal characterization tool from nanotechnology to nanochemistry

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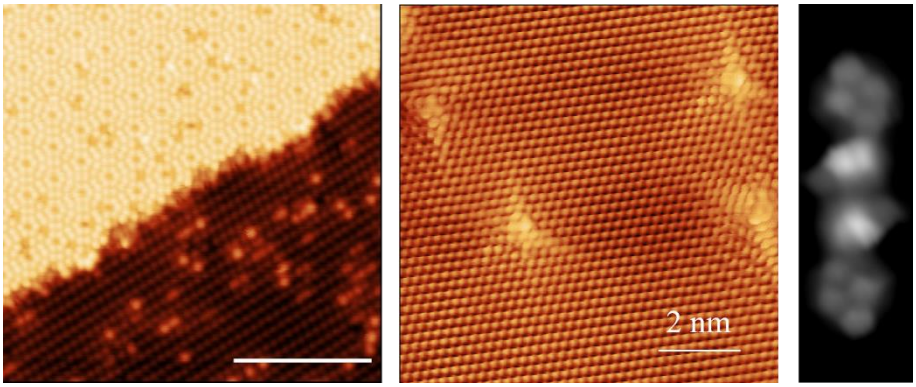
Abstract

Scanning tunnelling microscopy (STM) has been used to characterize conductive surfaces at atomic scale for more than 40 years, and its inventors were awarded the Nobel Prize in Physics in 1986 [1]. The fields of applications of this technique are plentiful, spanning from surface science to characterization of low-dimensional materials, like two-dimensional materials, to investigation of on-surface chemical reactions.

In this talk, I will give an overview of the work we do in our laboratory at the Physics Department of the University of Rome "Tor Vergata". I will show you a classical example of a surface science study where STM has been used to investigate the growth of thin films of CaF_2 in Si(111) [2]; a few examples where STM has provided key insights into the electronic properties of artificially-doped graphene (via oxygen-implantation or via surface doping) [3, 4]; and an example where STM has addressed fundamental questions on on-surface polymerization reactions and the formation of specific chemical bonds [5].

References

[1] Binnig G., Rohrer H. *IBM Journal of Research and Development* 30, 355 (1986).
[2] Galbiati M., et al. *Journal of Physics D: Applied Physics* 55, 095304 (2022)
[3] Mackenzie D. M. A., et al. *2D Materials* 8, 045035 (2021)
[4] Galbiati M. *The Journal of Physical Chemistry Letters* 12, 1262 (2021)
[5] Manuscript in preparation



***Left panel**: STM image of CaF_2 film (bottom right corner) grown on a Si(111) substrate which shows 7x7 reconstruction (top left corner). **Middle panel**: Point defects of N-doped graphene. The defects show triangular features; **Right panel**: Bond-resolved STM image of a molecular dimer (the pyrenes are clearly visible).*

Jueves, 20 de Abril de 2023
Aula IV (Ed. Trilingüe) @ 12:00h