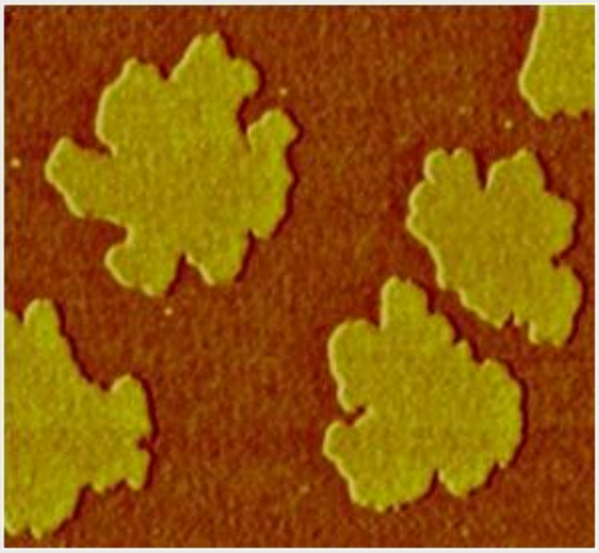
Advances in three-dimensional imaging, quantitative mapping and device fabrication by force microscopy

Wednesday, 6th February 2013. 12:00-13:00



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ABSTRACT:

Force microscopy is an enabling tool for nanoscience and nanotechnology. Three properties of the AFM help to explain its impact and relevance in Materials Science, the spatial resolution, the material sensitivity and the lithography potential. This presentation is divided in two sections. The first part is devoted to present a novel AFM method for high resolution and quantitative mapping of sof-matter interfaces [1-2]. Bimodal AFM is an emerging multifrequency technique that is characterized by a high signal-to-noise ratio and the ability to measure simultaneously different properties. Recent advances in the mapping of biomolecule and soft-matter properties (elastic and viscolastic properties) as well as the ability generate three dimensional maps of water layers adsorbed on proteins will be discussed. The last section is devoted to present the application of oxidation Scanning Probe Lithography to build molecular architectures and to fabricate silicon nanowire transistors and biomolecular sensors [3-4].

[1] R. Garcia and E.T. Herruzo, The emergence of multifrequency AFM, *Nat. Nanotechnol*. 7, 217-226 (2012).
[2] D. Martinez-Martin, E.T. Herruzo, C. Dietz, J. Gomez-Herrero, and R. Garcia, Noninvasive protein structural flexibility mapping by bimodal dynamic force microscopy, *Phys. Rev. Lett.* 106, 198101 (2011).
[3] M. Chiesa, P. P. Cardenas, F. Otón, J. Martinez, M. Mas-Torrent, F. Garcia, J. C. Alonso, C. Rovira, and R. Garcia, Detection of the Early Stage of Recombinational DNA Repair by Silicon Nanowire Transistors*, Nano Letters* 12, 1275 -1281 (2012).
[4] R.V. Martinez, M. Chiesa, R. Garcia, Nanopatterning of ferritin molecules and the

controlled size reduction of their magnetic cores, *Small* 7, 2914-2920 (2011).