synthesis of width modulated GNRs. We study the resultant junctions with STM and STS, and identify distinct electronic structures in individual GNR segments. We have additionally performed first-principles calculations that further support our experimental results.

Y.-C. Chen, D. G. de Oteyza, Z. Pedramrazi, C. Chen, F. R. Fischer, M. F. Crommie, ACS Nano 2013, 7, 6123
H. Sevinçli, M. Topsakal, S. Ciraci, Phys. Rev. B 2008, 78, 245402

General Force Reconstruction Method for Amplitude Modulation Force Microscopy Experiment

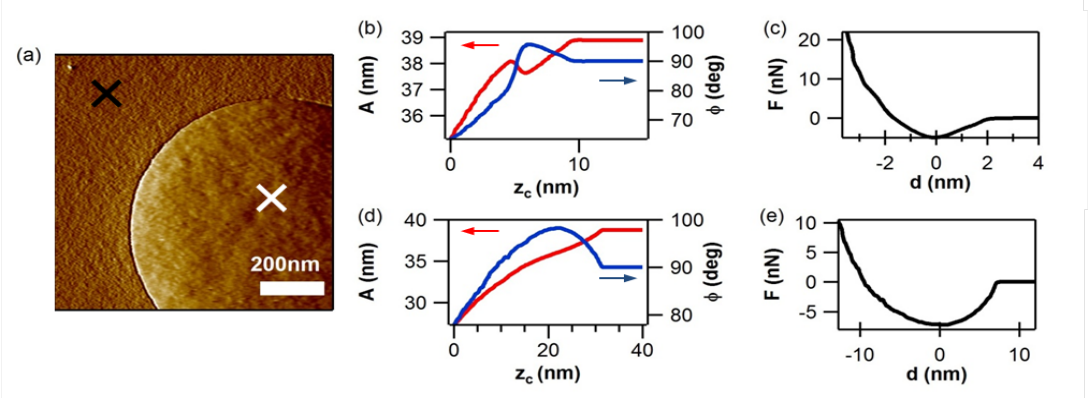
A.F. Payam, D. Martin-Jimenez , R. Garcia

Instituto de Ciencia de Materiales de Madrid (ICMM-CSIC), Madrid

E-mail: amir.farokh@csic.es

Amplitude Modulation Atomic Force Microscopy (AM-AFM) is the most widely used technique for nanoscale characterization of materials and surfaces in the air and liquid environments. High detection or sensitivities and smaller lateral forces with respect to contact AFM are the advantages of the dynamic modes of AFM. However, in AM-AFM experiments the interaction force is not direct observable [1].

Several methods have been proposed to recover the force in AM-AFM with the use of a unique frequency of excitation. These methods are valid either for small or large amplitudes relative to the indentation length [2]-[4]; or expand the force in terms of polynomials which require determination of a large number of parameters which makes them complicated for practical implementation [2], [5]. To overcome the above limitations, we develop a general method to transform the observables in amplitude modulation force microscopy into quantitative force measurements. The force reconstruction algorithm has been deduced on the assumption that the observables (amplitude and phase shift) are slowly varying functions of the average tip-surface distance. This method is general because is valid for small and large amplitudes; operation in air and liquid, compliant and rigid materials, conservative and non-conservative interactions alike. Numerical analysis and experimental tests verify the accuracy and validity of the proposed method.



(a) AFM image of polystyrene (PS) and polyolefin elastomer (LDPE) blend. (**b)** Amplitude and phase shift *versus* z-piezo displacement on PS corresponding to black cross in **a. (c)** Force reconstruction of PS. (**d)** Amplitude and phase shift *versus* z-piezo displacement on LDPE corresponding to white cross in **a. (e)** Force reconstruction of LDPE.

[1]. D. Platz, D. Forchheimer, E.A. Tholén and D.B. Haviland, Nat. Comm. **4**, 1360 (2013).
[2]. M. Lee and W. Jhe, Phys. Rev. Lett. **97**, 036104 (2006).
[3]. H. Holscher, U.D. Schwarz, int. J. Nonlinear Mech. **42**, 608-625 (2007).
[4]. A.J. Katan, M.H. van Es and T.H. Oosterkamp, Nanotech. **20**, 165703 (2009).
[5]. S. Hu and A. Raman, Nanotech. **19**, 375704 (2008).

Adsorption Geometry Of Pentacene On TiO2 Anatase Surface Resolved By Intra-molecular Atomic Force Microscopy Imaging

Cesar Moreno[1], Oleksandr Stetsovych[1], Milica Todorovic[2], Tomoko K. Shimizu[1], Rubén Pérez[2], Oscar Custance[1]

[1] National Institute for Materials Science (NIMS), 1-2-1 Sengen Tsukuba, Ibaraki 3050047, Japan [2] Departamento de Física Teórica de la Materia Condensada, Universidad Autonoma de Madrid, E-28049 Madrid (Spain)

TiO2 is very promising material because it is stable, non-corrosive, environmentally friendly, abundant and cost- effective. Since most of the peculiar properties of TiO2 are surface-mediated, a deep understanding of the surface properties of this reducible oxide material is a critical issue to develop high-performance devices. Furthermore, pentacene is an archetypical organic small molecule broadly used in organic electronics devices. Here, we present a characterization of the morphology and electronic properties of this molecule deposited at submonolayer regime on the TiO2(101) anatase surface by combining Kelvin Probe Force Microscopy and simultaneous atomic force microscopy / scanning tunneling microscopy working with atomic resolution. Intra-molecular structure of planar pentacene was successfully achieved (Figure 1) simultaneously with the atomic resolution of the titanium dioxide surface, allowing us to put insight in the adsorption geometry (shape, size and relative position) of pentacene on TiO2 surface with atomic accuracy. These experimental results have been corroborated by first-principles calculations.

Figure 1