SCANNING TUNNELING MICROSCOPY STUDY OF PTCDA GROWTH ON Ge(111)-c(2x8) SURFACES

A.J. Martínez-Galera, Zheng Wei[(a)], N. Nicoara, I. Brihuega[(b)] and J.M. Gómez-Rodríguez
Departamento de Física de la Materia Condensada, Universidad Autónoma de Madrid, E-28049, Madrid, Spain
[(a)] Permanent address: Department of Modern Physics, University of Science and Technology of China, Hefei, 230026 China
[(b)] Present address: Max-Planck-Institut für Festkörperforschung, Heisenbergstrasse 1, D-70569 Stuttgart, Germany
antonio.galera@uam.es

The epitaxial growth of organic molecules on metallic or semiconductors substrates is a highly interesting topic both from a fundamental point of view –in order to understand the physical properties of the interfaces of organic/inorganic materials- as well as by its applications in optoelectronics devices. The perylene and its derivatives have been proposed as appropriate materials for being used in these devices. Particularly, PTCDA (3,4,9,10 perylene tetracarboxylic dianhidride) has been proposed as a model system for the study of the epitaxial growth in metallic surfaces, since ultra thin well ordered films can be easily obtained [1,2]. However, in semiconductors substrates, due to the high reactivity of their surfaces, it is usually necessary to apply pasivation processes in order to induce molecular order [3]. In this work the initial stages of the growth of PTCDA at room temperature (RT) on the semiconductor surface Ge(111)-c(2x8) have been studied by means of scanning tunneling microscopy (STM). The results show that PTCDA molecules have a high mobility at RT on the well ordered areas of the substrate, since at submonolayer coverage nucleation is only observed in domain walls and defects of the substrate (Fig. 1). For higher coverages, it has been observed the formation of three-dimensional molecular islands, with crystalline structures close to those of the molecular bulk crystal, and grown on top of a first disordered molecular layer.

References:

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[3] N. Nicoara, O. Custance, D. Granados, J.M. García, J.M. Gómez-Rodríguez, A.M. Baró and J. Méndez, J. Phys.: Condens. Matter **15** (2003), S2619.

Figures:

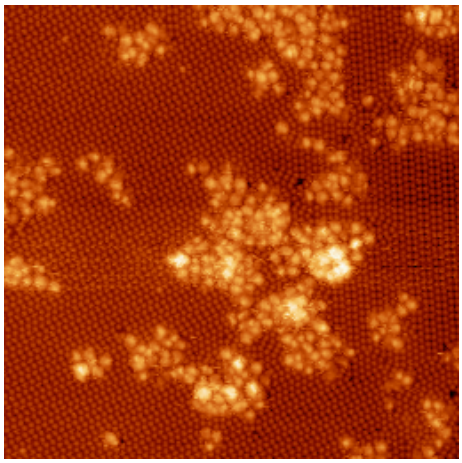

Fig. 1: STM image (50x50 nm^2) showing disordered molecular islands of PTCDA as well as clean substrate areas presenting the Ge(111)-c(2x8) reconstruction. Tunneling parameters: Vs = +1.5 V; I = 85 pA.