



TECHNISCHE UNIVERSITÄT  
CHEMNITZ

# Institut für Physik Physikalisches Kolloquium



**Mittwoch, 06.12.2017, um 16:00 Uhr**

Ort: Reichenhainer Str. 90;  
Zentrales Hörsaal- und Seminargebäude,  
Raum 2/N013

**Dr. Javier Méndez**

Instituto de Ciencia de Materiales de Madrid (CSIC), Spanien

## On-Surface Synthesis and Strategies for Graphene Growth

In this talk I will present the research lines carried out during the last years in the Structure of Nanoscopic Systems Group (ESISNA). These investigations are related to physicochemical processes taking place on surfaces, including molecular reactions and transformations, and, as final step in many cases, graphene growth from the decomposition of organic molecules.

I will show results on the cyclodeshydrogenation of planar precursor molecules to form fullerenes, or on the role of the substrate interaction in the resulting structures in the on-surface synthesis process. In these examples we have observed the transformation of precursor molecules into nanoobjects (fullerenes or domes) when the strong surface interaction reduces the molecular diffusion. In the case of a weak surface interaction, the intermediate molecules diffuse and coalesce to form aggregates and polymeric structures. More recently we are investigating other on-surface synthesis reactions concerning the formation of carbon nanoribbons from halogenates.

Another research line of the group is dedicated to the formation of graphene directly on isolating surfaces (such as diamond, SiO<sub>2</sub>, mica, TiO<sub>2</sub>). Among the strategies we investigate I will present a Molecular Beam Epitaxy (MBE) carbon source consisting on a glassy carbon filament. With it we have successfully proved the growth of graphene on metallic surfaces such as platinum or gold. Recent results also indicate that we have obtained the formation of graphene patches on diamond surfaces. Other strategies that we have used to form graphene are the decomposition of organic molecules on catalytic substrates, or the reaction of benzene halogenates.

Finally, if there is time, I will introduce other research line performed in the ESISNA group, as the graphene functionalization via functional molecular pinning, or the experiments concerning to the EU-synergy NANOCOSMOS project to mimic the physico-chemical conditions of a red giant or supernova leading to the formation of cosmic dust.

Our main experimental techniques consist on Scanning Tunneling Microscopes (STM) operating in UHV conditions, although we complement our investigations with other surface science techniques as X-ray photoemission (XPS), Atomic Force Microscopy (AFM), combined with the DFT theoretical calculations and Simulations.

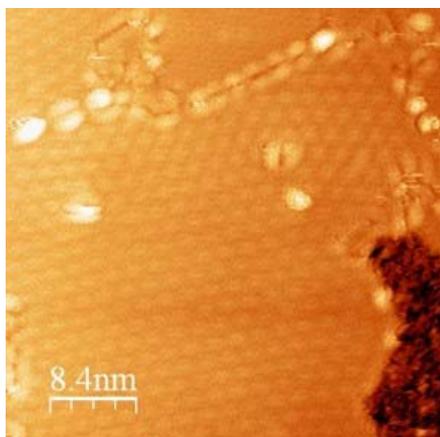


Figure 1: STM image of graphene on Pt(111) grown by C-MBE showing long range moiré patterns and atomic resolution (Bias Voltage = -35.7mV, Current set-point = 0.04nA).



Alle Zuhörer sind ab 15:45 zu Kaffee und Tee vor dem Hörsaal eingeladen.

Informationen zum Vortrag erteilt:  
Prof. Dr. Dr. h.c. Dietrich R.T. Zahn, Tel. 0371 531- 33036

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