Probing growth and properties of materials using fast and high-resolution x-ray photoelectron spectroscopy

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Since the seventies core level spectroscopy has played a key role in elucidating the geometric and electronic structure of solid surfaces. Recent experimental results in this field will be discussed with the aim of illustrating the breakthroughs achieved in this technique by the employment of x-rays generated by synchrotron light sources.

Due to their high localization, core electrons are extremely sensitive to the chemical state and to the local environment, and for this reason can be used for the identification of local configurations. The combination of high energy resolution now attainable with this technique (better than 100 meV) and the reduced data acquisition time (down to few ms per scan) has opened the possibility to probe the physical and chemical properties of a large variety of low-dimensional systems and to shed light on complex processes taking place on solid surfaces [1].

In this lecture I will show how this approach can be used in order to study in situ the growth mechanism, the thermal expansion and the stability of epitaxial graphene grown on transition metal surface.

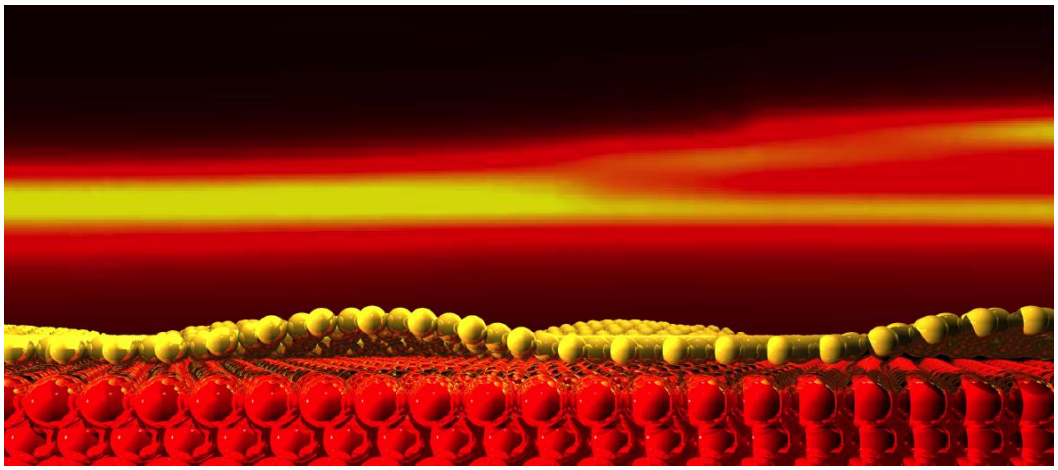

Figure caption: Two dimensional intensity plot of the C1s spectral evolution during the growth of a corrugated epitaxial graphene layer.

References

[1] A. Baraldi. *High-Energy Resolution Core Level Photoelectron Spectroscopy and Diffraction: Powerful Tools to Probe Physical and Chemical Properties of Solid Surfaces*, in Synchrotron Radiation. Springer-Verlag Berlin Heidelberg, 2014. ISBN 978-3-642-55315-8