High-energy resolution core level photoelectron spectroscopy

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Over the last 30 years core level spectroscopy has played a key role in shedding light on 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 radiation sources.

Due to their high localization, core electrons are extremely sensitive to the chemical state and to the local environment, and for these reasons can be exploited for the identification of local configurations. The combination of high energy resolution attainable with this technique (better than 50 meV) and the reduced data acquisition time (down to few ms per scan) has opened the possibility to probe a variety of physical and chemical properties of of low-dimensional materials and to shed light on complex processes taking place on solid surfaces.

In this lecture I will show how this approach can be used in order to study the interaction of atoms and molecules on solid surfaces. The growth mechanism, the interaction with adsorbates, the thermal expansion and the stability of epitaxial graphene grown on transition metal surfaces will be discussed as well.