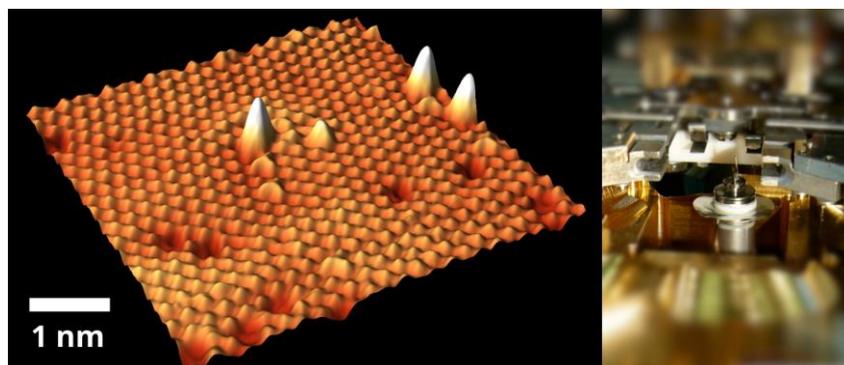


Atomic scale characterization of functionalized 2D materials by scanning tunneling microscopy

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The synthesis of stable tailored 2D nanostructured systems have become of paramount importance in catalysis, energy conversion and sensing applications. For example, the functionalization of low dimensional materials, resulting in an increased chemical reactivity, offers an alternative route to conventional catalytic processes. In the same way, the development of technologies to convert solar energy into chemical energy and electric power can constitute a valid and green alternative to the technology based on fossil fuels.

This project aims at identifying reproducible and scalable routes towards the synthesis of stable, functionalized 2D nanostructured systems and at providing proof of their enhanced physical and chemical properties. The experimental activity will be based on the expertise of the hosting research group, which exploits Scanning Tunneling Microscopy (STM) to achieve an accurate characterization of the prepared nanostructures. In particular, the project can rely on Low Temperature STM (down to 4 K) to elucidate the atomic structure of the layers and their electronic properties, and on Variable Temperature STM (100-900 K) to investigate at video rate the chemical reactivity over exposure to selected gases in realistic thermodynamic conditions. STM results will be complemented by X-ray photoemission spectroscopy measurement and ab-initio calculations performed through external collaborations. Beamtime application to external synchrotron radiation facilities will be also encouraged and supported.

The ideal PhD candidate is expected to have a Master degree in Physics, Chemistry or Materials Science, previous experience with vacuum technology and surface science techniques, high drive to solve challenges independently, attitude to work in an international research environment with collaboration spirit, and good English skills. Skills in scripting and analysis using programming languages will be an added value.

References

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