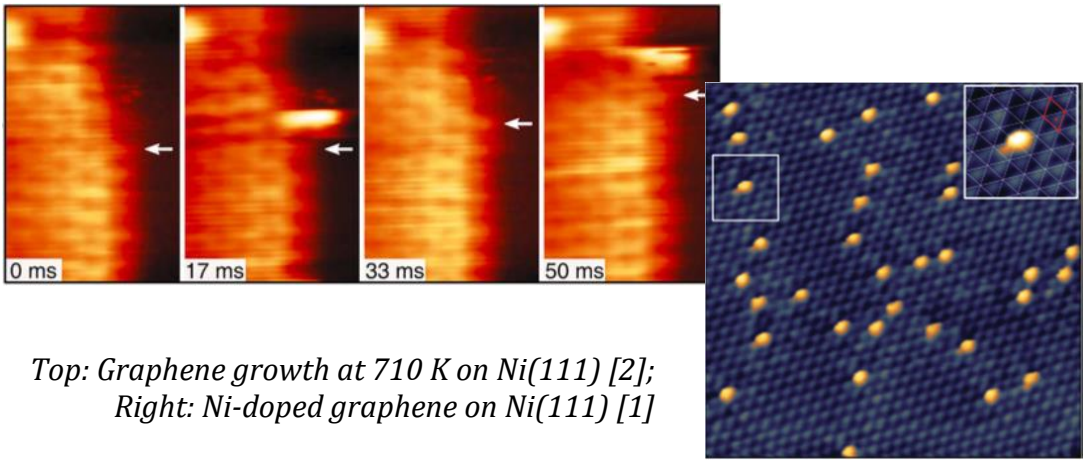
Functionalized 2D platforms investigated by scanning tunneling microscopy and photoemission spectroscopy

Building on the expertise of the hosting research group, this project aims at identifying reproducible and scalable routes towards the synthesis of stable tailored functionalized 2D nanostructured systems and at providing proof of their enhanced chemical activity for sensing and energy conversion. The preparation routes will follow both innovative bottom-up strategies and scalable and top-down approaches applicable in ultra-high-vacuum (UHV) conditions. Scanning tunneling microscopy (STM) and photoemission spectroscopy (XPS and UPS) will be exploited to achieve an accurate characterization of the prepared nanostructures and of their adsorption and reaction properties. In particular, STM experiments will elucidate the atomic structure of the layers [1] and the mechanisms at the basis of their synthesis [2], as well as their reactivity, also by imaging at video rate [3] and under gas exposure. STM results will be complemented by XPS and UPS measurements to investigate the chemical and electronic structure. Experimental findings will be interpreted also in combination with ab-initio calculations performed through external collaborations of the research group.
The activity will be developed in the frame of the Surface Structure and Reactivity at the Atomic Scale group of the Istituto Officina dei Materiali of the Italian National Research Council (CNR-IOM, www.iom.cnr.it)



Top: Graphene growth at 710 K on Ni(111) [2];
Right: Ni-doped graphene on Ni(111) [1]

References:

[1] V. Carnevali *et al*, Nanoscale **11** (2019) 10358
[2] L.L. Patera *et al*, Science **359** (2018) 1243-1246
[3] https://fastmodule.iom.cnr.it

Supervisor: Dr. Cristina Africh, CNR-IOM, africh@iom.cnr.it, https://www.iom.cnr.it/stras