

## **The BACH beamline: a multi-spectroscopy surface science approach for the investigation of advanced functional materials**

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The BACH beamline (Beamline for Advanced diCHroism) is an undulator beamline of the IOM Materials Foundry which operates at Elettra in Italy.

The beamline offers a multi-spectroscopy technique approach for the investigation of the electronic, chemical, structural, magnetic, dynamical properties of solid surfaces, interfaces, thin films and solid samples in the EUV-soft x-ray photon energy range with selectable light polarization, high resolving power in different environments and different time scales. The number of techniques and spectroscopy methods available at this beamline in a single endstation is unique and, furthermore, the samples (2D layers, thin metallic and oxide films, molecular layers, metallorganic architectures) can be prepared and grown in situ.

I will present a brief overview of some representative scientific results. As a first example, I will report recent findings on hexagonal boron nitride graphene acting as an effective barrier to confine gas molecules in a 2D interface.

I will then discuss the surface stability of layered advanced functional materials such as cadmium arsenides and van der Waals semiconductors in humid and oxidative environments and the impact of the surface stability in the exploitation of these materials in technological devices. Finally, I will report recent results on PtSe<sub>2</sub> and MoS<sub>2</sub> thin films grown at IEE.