ICFO

NANOFABRICATION SEMINAR | Beyond Topography: Advanced AFM for Local Electrochemistry, Nanomechanics and Nanospectroscopy

MARINOS DIMITROPOULOS

May 20, 2026
12:00 to 13:00
Seminar Room

Atomic force microscopy (AFM) is often introduced as a tool for nanoscale topography, but its real strength lies in how broadly the probe can be repurposed to interrogate functional materials and interfaces. Beyond conventional imaging and electrical modes, advanced AFM-based techniques can access local electrochemical activity, mechanical response and even chemical fingerprints with nanometre-scale resolution.

In this seminar, I will present a practical overview of advanced AFM modes that extend the technique from surface imaging to a multimodal nanoscale characterization platform. I will focus on nanopipette methods such as Scanning Ion Conductance Microscopy (SICM) and Scanning Electrochemical Cell Microscopy (SECCM), electrochemical AFM (EC AFM), nanomechanical measurements based on nanoindentation, and tip-enhanced Raman spectroscopy (TERS). Together, these approaches enable the study of materials in liquid environments and under bias, providing access to structure-property relationships that are difficult to obtain with conventional microscopy alone.

I will also briefly discuss complementary directions including scanning thermal microscopy (SThM) and high-speed AFM imaging, which further expand the AFM toolbox towards dynamic nanoscale phenomena. The goal of the talk is to show how advanced AFM can be used not simply to image surfaces, but to probe functional and transforming surfaces across electrochemistry, nanofabrication, and materials research.

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