

DYNASTY

DYNAmics and STructural analysiS of 2D materials

IESL SEMINAR
Wednesday 17/01/2024, 12:00
FORTH Seminar Room: C. Fotakis

Exploring the utility of Graphene and Hexagonal Boron Nitride as substrates in transmission electron microscopy for advanced materials characterization

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Abstract:

Transmission Electron Microscopy (TEM) is a powerful tool for investigating the structural and electronic properties of materials at the nanoscale. In recent years, the integration of 2D materials as sample substrates in TEM has attracted significant attention due to their unique properties. Graphene and hexagonal boron nitride (h-BN) stand out as exceptional substrates for a diverse set of TEM applications.

The first part of the lecture addresses the exceptional structural, electronic and chemical properties of both h-BN and graphene, emphasizing their specific advantages like their atomic thickness, high thermal stability and chemical inertness. These features make both graphene and h-BN ideal substrates for supporting sensitive specimens during TEM analysis, reducing background noise and preventing unwanted interactions that may alter the intrinsic characteristics of the sample.

The second section explores the impact of two dimensional substrates on imaging resolution and contrast enhancement in TEM. Moreover, the structural and conductive properties of h-BN and graphene can alleviate radiation damage, allowing for prolonged observation of electron beam sensitive materials.

The third section explores the promise of graphene and h-BN in facilitating in-situ experiments within the TEM environment. Researchers can exploit the stable and inert nature of both 2D materials to study dynamic processes, such as phase transitions, chemical reactions, and mechanical deformations with unprecedented clarity and precision in their native environment.

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This project receives funding in the European Commission's Horizon Research Programme under Grant Agreement Number 101079179