NANOFABRICATION SEMINAR: From Flakes to STM-Ready Samples: Fabrication of Clean Open-Surface 2D Twisted Heterostructures

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12:00 to 13:00
Seminar Room

Since the first isolation of graphene, the fabrication of 2D materials has evolved enormously. Today, many different 2D materials can be combined to create heterostructures wit different properties from their constituent materials. Additionally, we can set the twist ang e between layers with sub-degree precision, to create novel materials such as magic-ang e twisted graphene

When performing scanning tunneling microscopy (STM) on 2D materials, there is an additional constrathe **surface of the active material must remain exposed and atomically clean**. As STM probes the topmost atomic layer of the sample, it is extremely sensitive to any contamination left on the surface. This is a real challenge, because standard nanofabrication processes rely on polymers and solvents whose residues are hard to remove from 2D materials.?

In this seminar, I will present the fabrication techniques we have developed and implemente in our group to obtain clean open-surface 2D heterostructures, and walk you through ou workflow towards a fully functional sample. The process has three main steps. First, w perform the dry transfer process, by which the different 2D materials are assembled into single heterostructure. Second, we need a step which ensures our topmost surface is clean For this purpose, we have two different methods, which we call the flip and the hBN sliding Finally, the layers are electrically contacted without exposing the sample to any lithographi process. During the talk, I will guide you through all these steps emphasizing the critic l details of the process

Along the way, the workflow relies on several nanofabrication protocols, including S -8 lithography, KOH wet etching, evaporation, PDMS casting and dry transfer. I will explain ow they work and how we have implemented them at ICFO.

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