

# **Inert atmosphere cluster tool for the fabrication and characterization of air-sensitive 2D materials and devices**

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## **Abstract:**

Van der Waals materials and heterostructures constructed from different components through transfer stacking constitute a rich and versatile platform for the discoveries of emergent quantum phenomena and potential applications in electronic devices, biosensors, catalysts, and energy cells. Some van der Waals materials are air sensitive, the preparation, transfer and characterization of which require an inert atmosphere provided by a glovebox. The Inert atmosphere cluster tool of the 2DCC offers a low-oxygen and low-water environment to enable the fabrication and characterization of air-sensitive van der Waals heterostructures and devices with high controllability. Three major instruments are housed in two connected argon gas-filled gloveboxes. The tool features a state-of-the-art transfer stage from HQ Graphene, an atomic force microscope from Asylum Research (MFP-3D Origin+) and has a built-in e-beam physical vapor deposition system that allows the making of devices using stencil masks. With a vacuum suitcase, this glovebox cluster can also connect to other facilities in the 2DCC, including the MBE, ARPES and MOCVD chambers. These capabilities allow the assembly of hetero-interfaces between air-sensitive thin films and van der Waals flakes to build structures difficult to grow in a single environment.

More information is provided in <https://www.mri.psu.edu/2d-crystal-consortium/user-facilities/materials-transfer-and-processing>

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