

High voltage options for Jupiter XR



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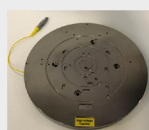
Atomic Force Microscopes (AFMs) enable electrical measurements in many research fields including semiconductors, piezoelectric & ferroelectric materials, 2D materials, thin films, capacitors and others. The main electrical imaging modes available on the Jupiter XR include piezoresponse force microscopy (PFM), scanning capacitance microscopy (SCM), conductive AFM imaging (ORCA) and nanoscale time dependent dielectric breakdown (nanoTDDB).

Jupiter XR is a large sample AFM and, in its standard configuration, it allows for ± 10 V of bias to be applied to the AFM probe or to the sample. Often, depending on the type of material or its dimensions, more than ± 10 V are needed to perform advanced electrical experiments. When larger bias is required, several high voltage configurations are available for Jupiter XR depending on the experiment type and the sample size.

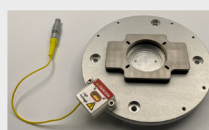


High voltage hardware

High voltage chuck



High voltage accessory chuck



High voltage probe holder



High voltage ORCA probe holder



High voltage experiment

PFM mode, graphene cutting, tip or sample bias. Samples up to 200 mm in diameter.



PFM mode, graphene cutting on small* samples while using accessories for sample heating, cooling, for changes in magnetic field or control of gas environment.



nanoTDDB on samples up to 200 mm in diameter.



nanoTDDB on small* samples while using accessories for sample heating, cooling, for changes in magnetic field or control of gas environment.



* Max sample size is determined by the accessory used

Figure 1: Chart of high voltage hardware required depending on the high voltage experiment.

High voltage chuck

The high voltage (HV) chuck replaces the standard chuck for high voltage operation. Bias of ± 150 V can be safely applied to the entire HV chuck. The HV chuck has both: embedded magnets and vacuum grooves to secure samples. Samples up to 200 mm in diameter can be used with the HV chuck.

High voltage accessory chuck

High voltage (HV) accessory chuck replaces the regular accessory chuck for high voltage experiments when environmental control accessories are used. The accessories currently compatible with the high voltage option on Jupiter XR include: PolyHeater, CoolerHeater and variable field module (VFM). The sample size that can be used with the HV accessory chuck is determined by the accessory used. Bias of ± 150 V can be safely applied when using the HV accessory chuck.

High voltage probe holder

High voltage probe holder enables bias, up to ± 150 V, to be safely applied to the tip. For the high voltage probe holder to function, it must be set up with either a HV chuck or the HV accessory chuck.

High voltage ORCA probe holder

High voltage ORCA probe holder enables high voltage nanoscale time dependent dielectric breakdown (nanoTDDB) experiments. The high voltage ORCA probe holder is resistor-protected from high current spikes that are expected during nanoTDDB experiments. For the high voltage ORCA probe holder to function, it must be set up with either a HV chuck or the HV accessory chuck.

High voltage connection cables

High voltage (HV) connection cables direct the bias to either the AFM probe or to the sample. High voltage operation on Jupiter XR will only be enabled when the HV probe holder and the HV chuck are connected with the HV connection cables to create a close circuit. The cables have push/pull LEMO connectors for ease of use.

A note about safety

The use of any high voltage option on the Jupiter XR AFM is worry-free thanks to the safety features that were incorporated into the design. When using high voltage hardware, redundant fail-safe interlocks are in place to prevent user exposure to high voltages. The high-voltage signal path to the tip and/or sample bias is disconnected automatically any time that the enclosure door is opened. Additionally, software prevents high voltage experiments to proceed unless all the necessary high voltage components are connected correctly.

Contact Asylum Research
to find out more about
Jupiter XR large sample AFM,
high voltage accessories and
how they can advance
your research.

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