




Dielectric Materials

Ferro/piezoelectrics, MEMs, NEMs, multiferroics, polymers, solid oxides SOFC, ionic conductors, solid electrolytes, nanomaterials, thin-film materials, quantum dots

smart phones | displays | loudspeakers | earphones | aerospace guidance systems
semiconductor memory devices | cable insulators | fuel cells | solid state batteries

the **xm** difference

-  **Market leading impedance analysis**
-  **Widest voltage and current range available**
-  **Time domain and impedance analysis in a single system**



ModuLab[®] XM MTS is the only dielectric materials test system that combines an accurate time domain analyzer and a high performance impedance analyzer into a single "plug and play" modular chassis. Purpose built for dielectric materials research the ModuLab XM provides:

- High-performance impedance analysis throughout the entire frequency range and across all three modes of operation
 - Swept sine (highest accuracy and repeatability)
 - Multi-sine/FFT (for increased test throughput especially at low frequency)
 - Harmonic analysis (to study non-linear materials)
- Optional 100 V test range enables tests of the linearity / breakdown properties of materials
- Low frequency (<10 Hz) impedance/C-V analysis for material purity and electrode polarization studies
- Multi-component system calibration for ensured measurement accuracy (capacitance and $\tan \delta$)
- Market leading frequency range and resolution for resonance analysis (1 in 65,000,000)
- Staircase or smooth 'analog' ramp waveforms. Important for I-V, hysteresis and polarization measurements.
- Wide current measurement range (over 16 decades from 0.1 fA to 2A). Ensures dielectric, insulator and conductor materials can be accurately characterized, including low loss / low leakage materials.
- Available voltage and current amplification modules (100 V amplifier and femto ammeter) for the greatest flexibility in application
- Compatibility with highly efficient cryostats, high temperature furnaces, and sample holders
- User friendly software with simple three step test setup/run, built-in live waveform displays, connection diagrams and equivalent circuit/ I-V fit functions
- Compatible potentiostat modules available for whole cell testing (e.g. solid oxide fuel cell)

Accessories

129610A Cryostat System

Materials researchers often need to characterize the electrical performance of materials over a wide range of temperature, e.g. ionic conductors in solid oxide fuel cells, semiconductor and electronic materials, ceramic materials for aerospace applications

Solartron's 129610A provides :

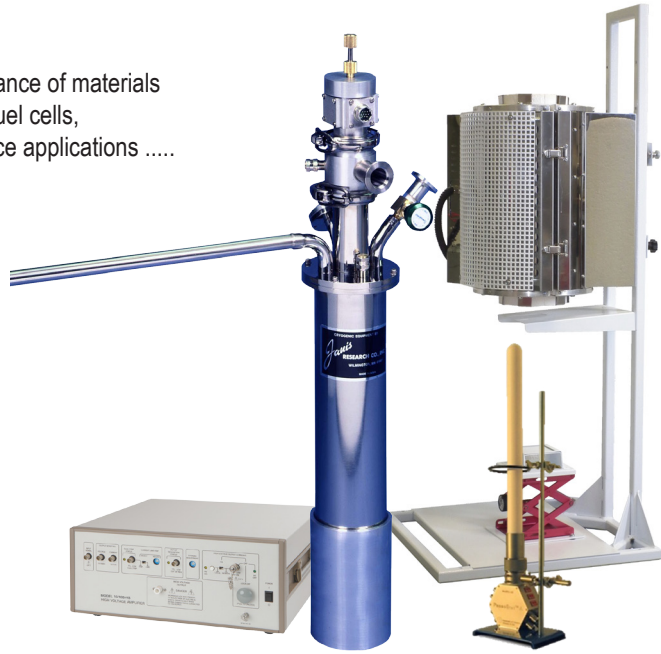
- Sample in static gas (no sample cracking)
- Very low cryogen usage (typically 250 ml/hr @ 77 K)
- Operation to 78K with LN₂, 5K with LHe
- Switching between LHe/LN₂ operation per experiment.

Furnace Systems

ModuLab XM is compatible with various configurable high temperature furnace systems for testing ionic conductors, solid oxide, and solid electrolytes.

High Voltage Amplifiers

ModuLab XM internal option modules provide up to ± 100 V operating range and is compatible with external amplifiers for high voltage operation (in the order of 10 kV).



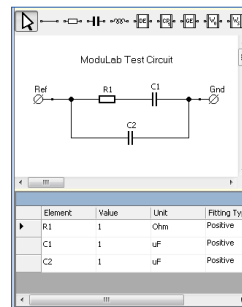
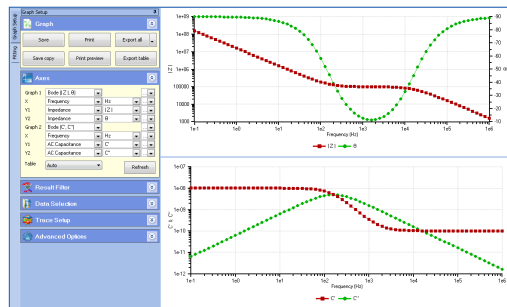
Software

ModuLab XM MTS software is a very flexible and comprehensive materials test software package. A large selection of test types are provided, from standard open circuit, I-V, pulse, C-V, Mott-Schottky to complete multi-step sequences that can include sample temperature control using a cryostat or high temperature furnace.

As test parameters are entered into the software, a waveform diagram displays the timing and levels that will be applied to the sample when the test is run.

Equivalent circuit models may be constructed using a range of components including resistors, capacitors, inductors, distributed elements, constant phase elements, Gerischer elements, and Warburg open / short elements.

A built-in report generator takes test results and outputs them, together with graphs, diagrams and analysis information into your selected word processor software.



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