Magnetoelectric Thin Film/Bulk Ceramic Bundle

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The Magnetoelectric Test is executed in Vision on a Precision ferroelectric tester by the Magnetoelectric Response Task, ME Task for short. Radiant also offers a Magnetoelectric Bundle that provides a complete hardware/software package to make testing Magnetoelectric response simple and cost effective.

An exciting new area of scientific exploration examines the potential usefulness where magnetic field effects occur simultaneously with ferroelectric effects in materials and structures. Where these two properties, ferromagnetism and ferroelectricity, are coupled in the same material, the material is called a multiferroic. The most common material studied today for this characteristic is Bismuth Iron Oxide (BFO). Similar properties can be created in a device by physically bonding magnetic materials to piezoelectric or ferroelectric materials. Such a device will be referred to as a magnetoelectric composite device. Magnetoelectric composites have great potential to create new sensors and energy harvesters.

There are a wide variety of measurements besides the magnetoelectric response that can be executed with the Magnetoelectric Response Task and Hardware Bundle

1) Polarization Hysteresis vs Magnetic Field

2) Remanent Polarization vs Magnetic Field

3) PUND vs Magnetic Field

4) Conduction vs Magnetic Field (the so-called magneto-resistive memory effect)

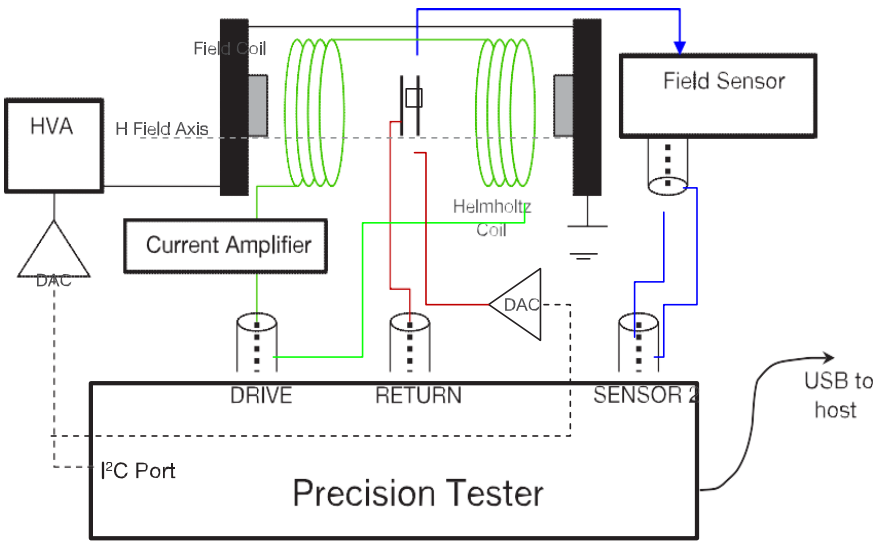
5) IV vs Magnetic Field

6) Small Signal Capacitance vs Magnetic Field

Magnetoelectric Hardware/Software Bundle:

Radiant's magneto bundle offers researchers a complete platform to efficiently characerize magnetoelectric thin film or bulk devices.

The Thin Film or Bulk Magneto Hardware and Software Bundle Includes: Radiant Precision Current Source CS-2.5 (includes 2 voltage outputs, current sensor, 2.5 amp current source Hemholtz Coil,Gauss meter, Test Fixture for thin film or bulk devices and Magnetoelectric software task.



Conclusion

The Magnetoelectric Response Task adds a new dimension to the characterization of capacitors. It measures the charge generated by a multiferroic capacitor or a magnetoelectric composite device when the sample is stimulated with a magnetic field. The ME task will accommodate a wide variety of coils and magnetic field sensors.

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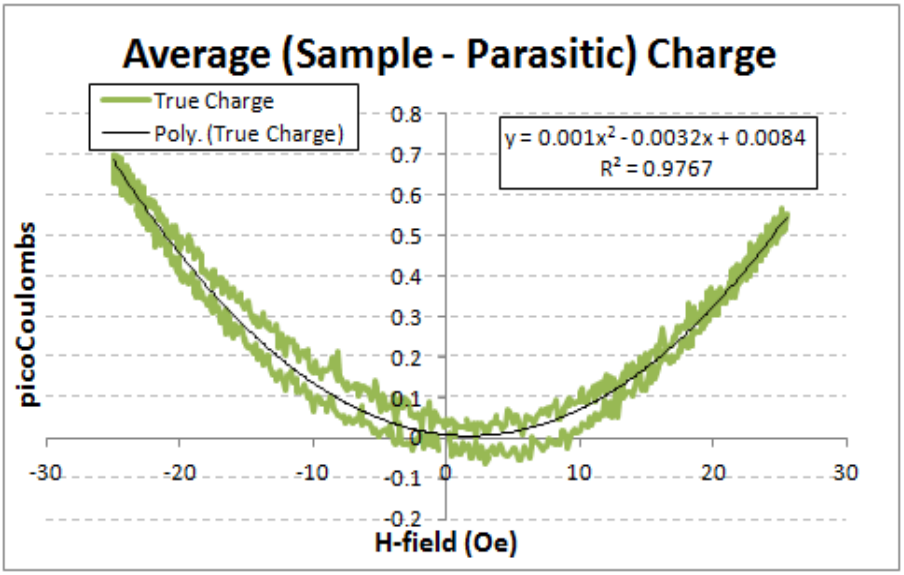
The figure below shows the response of a reference sample measured with the Magnetoelectric Response Task. The result in the figure below was within 15% of the theoretical value given the calculated strength of the magnet and the piezoelectric coefficients of the PNZT capacitor.



Large Signal Magnetoelectric Response

For some devices like magnetoelectric MEMs built with thin ferroelectric films, this magnetic field amplitude generates a large charge response. Bulk ceramic ME devices, on the other hand, generate very small charge levels at the ±50 Oe range. It is relatively easy to execute the ME Task measurements at the larger field amplitudes by replacing the Helmholtz coil with a Field coil. The field coil, of course, requires a much larger current source to drive it. Please contact Radiant Technologies, Inc., for optional field coils.

Radiant Technologies, Inc.

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