

MAGNETO RESISTANCE MEASUREMENT SYSTEM

MODEL MRS1.8T



ABOUT THE SYSTEM

Magnetoresistance is the tendency of a material preferably ferromagnetic to change the value of its electrical resistance in an externally-applied magnetic field. There are a variety of effects that can be called magnetoresistance. One occurs in bulk non-magnetic metals and semiconductors, such as geometrical magnetoresistance, or the common positive magnetoresistance in metals. Other effects occur in magnetic metals, such as negative magnetoresistance in ferromagnets or anisotropic magnetoresistance (AMR). Finally, in multicomponent or multilayer systems (e.g. magnetic tunnel junctions), giant magnetoresistance (GMR), tunnel magnetoresistance (TMR), colossal magnetoresistance (CMR), and extraordinary magnetoresistance (EMR) can be observed.

MODEL MRS1.8T

Various tests performed by this model

- Software to set field automatically for all four quadrants
- Standard graph and data in tabular form for following
- I/V Current vs voltage in fixed magnetic field
- DC resistivity at different magnetic field

Optional test performed by this model

- Low temperature cryostat for magneto resistance

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MAGNETO RESISTANCE MEASUREMENT SYSTEM



General Specifications

DC Pole Magnets

Field 1.8T U frame magnets
Max. Pole gap 100 mm
(field vs. pole gap chart provided)
Pole diameter 4 inches (100mm)
Magnet diameter 12 inches
Resolution 10 gauss
H/U frame constructed with TATA A grade steel
Thermal protection, Air cooled

Magnetic Power Supply

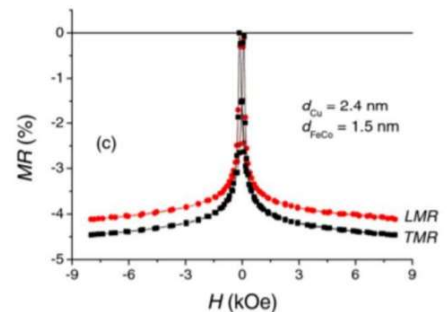
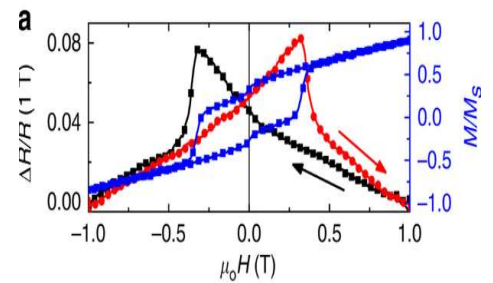
120V, 10 amps bipolar power supply
Input 220V/440VAC 50Hz
Stability 1%
Overload protection
Thermal shut off

Hall Probe

Hall probe display unit
Resolution 10 gauss in 2 Tesla range
PC controller card
Software for field variation

PC control

Fully functional manual/auto control
In auto data acquisition system



MAGNETO RESISTANCE MEASUREMENT SYSTEM

Source Measure Unit 2450

Voltage compliance 200V DC
Current range 10 Nano to 1 A
Resistance range 10 milli ohm to 10 Giga Ohm
Resolution 1% of the range
Accuracy 0.1%
Auto ranging
USB Interface



System Test Specifications

Magnetic Field

- DC Field Resolution 10 gauss
- Stability $\pm 1\%$
- Frequency range 1Hz to ≥ 1 MHz
- AC Field Resolution 1oe to ≥ 200 oe
- Voltage signal range ≤ 0.01 uV

Source Measure Unit 2450

- Force/Measure Voltage
- Force/Measure current
- Resistivity range micro ohm Cm to Mega Ohm Cm
- Resolution of measurement 1% of the range
- Resistance range 10 milli ohm to 10 Giga Ohm
- Temperature resolution 0.1 degree

Optional accessories

- Low temperature cryostat

MAGNETO RESISTANCE MEASUREMENT SYSTEM

MRS 1.8T Sub Components



6.1.4 Data file of DC resistance

Following is the data file of the DC resistance measurement system

Se no.	TIME	LOG ROH	TEMPERATURE	VOLTAGE	CURRENT	RESISTANCE	RESISTIVITY
0	10.0		3.180E-3	10.021	+1.359941E-09A	7.369E+9	7.368588E+9
1	10.7		3.180E-3	10.021	+1.355281E-09A	7.394E+9	7.393924E+9
2	11.0		3.181E-3	10.021	+1.360248E-09A	7.367E+9	7.366925E+9
3	11.3		3.181E-3	10.021	+1.356373E-09A	7.388E+9	7.387972E+9
4	11.6		3.181E-3	10.021	+1.356382E-09A	7.388E+9	7.387923E+9
5	11.9		3.181E-3	10.021	+1.355999E-09A	7.401E+9	7.400925E+9
6	12.2		3.181E-3	10.021	+1.349778E-09A	7.424E+9	7.424060E+9
7	12.5		3.181E-3	10.021	+1.352823E-09A	7.407E+9	7.407359E+9
8	15.2		3.181E-3	10.021	+1.324546E-09A	7.565E+9	7.565494E+9

List of deliverables

- Bipolar DC Electromagnet
- Magnetic power supply
- Hall probe
- PC Control card
- Sample Holder
- Keithley 2450

List of users

- BUET BANGLADESH
- IIT PATNA
- RCAT INDORE
- UNIVERSITY OF SHIMLA
- IIT CEHNNAI
- UNIVERSITY OF DELHI
- DMRL HYDERABAD
- CENTRAL UNIVERSITY HYDERABAD
- OSMANIA UNIVERSITY HYDERABAD