

## Instrument Capabilities and Usage Policy

A state-of-the-art temperature-dependent thermoelectric power (thermopower) measurements on electrically conductive specimens are acquired through the CAS Research Instrumentation Initiative, 2019. The system is purchased through MMR Technology (<http://www.mmr-tech.com/seebeck.php>). The addition of this unit will enhance research in the field of thermoelectric materials. The unit will be used by researchers across the campus from Physics, Chemistry, Mechanical Engineering, and Electrical engineering.



The system can provide information about the sign of the majority carrier, the mechanism of charge conduction, and in conjunction with appropriate theoretical models, information on the band structure of the material under investigation. Thermopower measurements are also an effective way of determining the intrinsic properties of samples having an electrical conductivity that is dominated by an extrinsic defect structure as Seebeck measurement system. proposed in this proposal. High sensitivity to structural change makes thermopower measurements an excellent technique for the study of structural phase conditions on the charge transport properties of a given material.

The system boasts high accuracy and reproducibility of Seebeck coefficient measurements  $\sim 50$  nV. The minimum heater step size is 0.1 mW and has an automatic operation in a single step against an internal reference material. The system can measure thermopower in a wide temperature range from 77K 770K. The unit is computer controlled and has software for data analysis.

### User Policy

The Seebeck measurement unit is available for campus and public use. To schedule use of the instrument, the user needs to directly contact Dr. Mishra at [srmishra@memphis.edu](mailto:srmishra@memphis.edu). The system will be available on the first-come, first-serve basis. Prior to using instrument Dr. Mishra will

provide initial training to the user. Due to the turn-key nature of the instrument, minimum training is required for the user. A proper user logbook will be maintained for the instrument usage. Data will be secured and will be transferred out of the computer on a secured disk as a part of the yearly maintenance of the equipment. A fee structure is established for the use of above facilities for both internal and external users. The fee structure is determined in tandem with the Integrated Microscopic Center (IMC) on campus, as shown below. For those faculties who contribute their own research funds using Dr. Mishra's Nanomaterials Research Facility, will be considered as a prepaid user for the future service. The recovered cost will go towards regular maintenance, contract service, and consumable items.

**The fee is charged in whole hour increment with minimum charges for 1 hour.**

<b>Instrument</b>	<b>Internal User Rate/Hr.</b>	<b>External User, Non- Profit Organization rate/Hr.</b>	<b>External User, For- Profit Organization rate/Hr.</b>
<b>MN 212</b>	<b>\$50</b>	<b>\$80</b>	<b>\$100</b>
<b>Technical</b>	<b>\$50</b>	<b>\$80</b>	<b>\$120</b>