

## **Novel Ac Heating- Dc Detecting Method for Active Thermoelectric Scanning Thermal Microscopy**

Tingting Miao<sup>S</sup>

*Department of Thermal Engineering, China University of Petroleum, Beijing, China*

Xing Zhang<sup>C</sup> and Weigang Ma

*Department of Engineering Mechanics, Tsinghua University, Beijing, China*

*x-zhang@tsinghua.edu.cn*

A novel and reliable ac heating – dc detecting method is developed for active thermoelectric scanning thermal microscopy, which can map out the local thermal property imaging by point heating and point sensing with nanoscale spatial resolution. The thermoelectric probe is electrically heated by an ac current and the corresponding dc thermoelectric voltage is detected. Using the measured dc voltage, the temperature information can be extracted with the known Seebeck coefficient of the thermoelectric probe. The validity and accuracy of this method have been verified by a 25.4  $\mu\text{m}$  K-type thermocouple both by experiment and numerical simulation in high vacuum and in air. The experimental results show that the proposed method is reliable and convenient to monitor the temperature of the junction.