APS March Meeting 2016

Monday–Friday, March 14–18, 2016; Baltimore, Maryland

Session S27: Carbon Nanotube & Related Materials: Thermal, Mechanical & other Properties

11:15 AM–2:15 PM, Thursday, March 17, 2016

Room: 326

Sponsoring Unit: DMP

Chair: Michael Schroeter, Technical University Dresden

Abstract ID: BAPS.2016.MAR.S27.3

Abstract: S27.00003 : Thermal conductivity of a film of single walled carbon nanotubes measured with infrared thermal imager

11:39 AM–11:51 AM

Preview Abstract *MathJax* ***On*** | *Off* ← *Abstract* →

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Heat dissipation has restricted the modern miniaturization trend with the development of electronic devices. Theoretically proven to be with high axial thermal conductivity, single walled carbon nanotubes (SWNT) have long been expected to cool down the nanoscale world. Even though the tube-tube contact resistance limits the capability of heat transfer of the bulk film, the high intrinsic thermal conductivity of SWNT still glorify the application of films of SWNT network as a thermal interface material. In this work, we proposed a new method to straightly measure the thermal conductivity of SWNT film. We bridged two cantilevered Si thin plate with SWNT film, and kept a steady state heat flow in between. With the infrared camera to record the temperature distribution, the Si plates with known thermal conductivity can work as a reference to calculate the heat flux going through the SWNT film. Further, the thermal conductivity of the SWNT film can be obtained through Fourier's law after deducting the effect of thermal radiation. The sizes of the structure, the heating temperature, the vacuum degree and other crucial impact factors are carefully considered and analyzed.