Contribution ID: **91** Type: **Oral Presentation**

Elastic and Thermal properties of phase change materials (PCM): Sb2Te3 and Ge1Sb4Te7

Tuesday, 9 July 2019 12:40 (20 minutes)

Intensive interest on Ge-Sb-Te (GST) based alloys is driven by their outstanding electrical and optical properties which makes them excellent candidates for universal nonvolatile memory applications, also known as the phase change random access memory (PCRAM). The operating principle of the PCM is based on the rapid iterative reversible transition between two structural phases after a threshold voltage. However, their thermal conductivity is critical to device performance since it determines the resistance drift during the cyclic joule heating of the sandwiched active layer. Very few studies have been reported on the elastic and thermal properties of ternary alloys formed from GeTe and Sb2Te3 building blocks. In this work, thin films of Sb2Te3 and Ge1Sb4Te7 deposited by RF magnetron are investigated to establish the dependence of acoustic hardening on Sb2Te3 rich phase change alloy. Using the measured elastic properties and acoustic phonon velocities, the dependence of thermal conductivity on the Sb2Te3 fraction in Ge1Sb4Te7 by surface Brillouin scattering based on the minimum conductivity model is established.

Apply to be
 considered for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD, N/A)?

MSc

Primary author: Mr TJALE, Phuti Balty (School of Physics, University of the Witwatersrand, Private Bag 3, 2050 WITS)

Co-authors: Dr MATHE, Bhekumusa (University of the Witwatersrand); Dr WAMWANGI, Daniel (wits university); Prof. BILLING, David (University of the Witwatersrand); Ms BALOI, Mmapula (University of the Witwatersrand); Mr NJOROGE, eric (university of pretoria)

Presenter: Mr TJALE, Phuti Balty (School of Physics, University of the Witwatersrand, Private Bag 3, 2050 WITS)

Session Classification: Physics of Condensed Matter and Materials

Track Classification: Track A - Physics of Condensed Matter and Materials