Center for Memory and Recording Research and the Q-MEEN-C EFRC

SEMINAR TALK BY

ARUNAVA GUPTA

when:

MONDAY, AUGUST 26, 2019

10:30 AM Refreshments

11:00 AM Seminar

where:

JKW AUDITORIUM

CMRR BUILDING

- biography -

Arunava Gupta is Distinguished University Research Professor and MINT Professor at the University of Alabama (UA). He holds a joint appointment in UA's College of Arts and Sciences and College of Engineering, and is associate director of UA's Center for Materials for Information Technology (MINT Center). Gupta received his undergraduate degree from the Indian Institute of Technology, Kanpur, and Ph.D. degree in Chemical Physics from Stanford University. Prior to joining UA's faculty in 2004, he worked as a research staff member and manager at the IBM Thomas J. Watson Research Center in New York. Gupta's expertise is in investigating thin films and nanostructured materials for use in information technology and energy applications. He has co-authored more than 400 peerreviewed scientific articles and holds 30 US patents. Gupta is an elected fellow of the American Physical Society, the American Association for the Advancement of Science and the Materials Research Society. He received the Humboldt Research Prize in 2010, awarded by the Alexander von Humboldt Foundation.

- abstract -

Revisiting Spinel Ferrites: Thin Films Grown on Isostructural Lattice-Matched Substrates

Spinel ferrite thin films have numerous technological applications in areas such as telecommunications, magneto-electric coupling devices and are also promising candidates for future spintronic devices. Usually films of spinel ferrite such as NiFe2O4 (NFO), grown both by both physical and chemical deposition techniques, suffer from a number of structural and magnetic drawbacks, e.g. formation of antiphase boundaries and high magnetic saturation fields. We show that by using substrates having similar crystal structure and low lattice mismatch, one can avoid formation of antiphase boundaries and thereby obtain magnetic properties comparable to bulk single crystal. We used spinel MgGa2O4, CoGa2O4 and ZnGa2O4 substrates, which have 0.6%, 0.1% and 0.05% lattice mismatch, respectively, with NFO to grow epitaxial films that are essentially free of antiphase boundaries and exhibit sharp magnetic hysteresis characteristics. Moreover, ferromagnetic resonance linewidths similar to those in single crystals are obtained. We investigated spin transport properties of the NiFe2O4 films grown on the three substrates via the longitudinal spin Seebeck effect (LSSE). An increase in the spin voltage signal with reduction in lattice mismatch is observed, which is in correspondence with similar improvements in structural and magnetic properties. We further demonstrate that bidirectional field-dependent LSSE voltage curves can be utilized to reveal the complete magnetization reversal process, which offers a new vectorial magnetometry technique based on spin caloric effect.