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Growth and characterization of tunable BSTO/BaM multilayers as substrates for magnetic nanoparticles N. A. FREY, R. HEINDL, S. SRINATH, H. SRIKANTH, Physics Department, University of South Florida, K. R. COFFEY, AMPAC, University of Central Florida, N. J. DUDNEY, Oak Ridge National Laboratory — Multilayers of Ba0.5Sr0.5TiO3 (BSTO) and BaFe12O19 (BaM), with tunable permeability and permittivity are attractive systems for multifunctional applications. We have grown multilayers of BSTO and BaM using magnetron sputtering on Al_2O_3 and Si/SiO_2 substrates. Film growth conditions such as sputtering parameters were optimized to obtain high quality multilayers. X-ray diffraction established that both BSTO and BaM were formed and cross-sectional SEM studies showed distinct interfaces between BSTO and BaM layers. Magnetization measurements taken with a Physical Properties Measurement System (PPMS) showed a large coercivity ($\sim$2000 Oe) consistent with the hard magnetic hexaferrite component. The hysteresis loops also revealed the influence of magnetocrystalline and shape anisotropies at different temperature ranges. The multilayer structures can be made even more versatile with the inclusion of magnetic nanoparticles to help achieve a greater degree of tunability and frequency agility under applied electric and magnetic fields. Fe_3O_4 nanoparticles were deposited on the multilayer film surface using the Langmuir-Blodgett technique. Images of the resulting structures will be presented. Work at USF supported by DARPA/ARO through Grant No. DAAD 19-03-1-0277

Srikanth Hariharan

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