Electronic Materials and Photonics Division
Room Ballroom A - Session EM-ThP

Electronic Materials and Photonics Poster Session

EM-ThP-2 Synthesis and Characterization of Pb($In_{1/2}Nb_{1/2}O_3$)-Pb($Mg_{1/3}Nb_{2/3}O_3$)-$PbTiO_3$ Thin Films Grown by Pulsed Laser Deposition*, **Da-Ren Liu,*** Taiwan Instrument Research Institute, National Applied Research Laboratories, Taiwan

Because of their extraordinary large electromechanical coupling coefficient and piezoelectric coefficient, relaxor-based ferroelectric crystals Pb($Mg_{1/3}Nb_{2/3}$)O_3–$PbTiO_3$ (PMN–PT) and Pb($In_{1/2}Nb_{1/2}$)O_3–Pb($Mg_{1/3}Nb_{2/3}$)O_3–$PbTiO_3$ (PIN–PMN–PT) with morphotropic phase boundary (MPB) have attracted extensive attention. They also become important materials in the fabrication of high-performance electromechanical devices including transducers, actuators and sensors. However, with its concentration of PT near the morphotropic phase boundary region, the PIN–PMN–PT not only has similar piezoelectric performance to that of the binary PMN–PT but also possesses higher phase transition temperature and coercive field. In this study, highly textured thin films of the PIN–PMN–PT were grown on $SrTiO_3$ substrates by Nd:YAG pulsed laser deposition(PLD). According to the results of glancing-angle x-ray powder diffraction (GAXRD), the PIN-PMN-PT films are polycrystalline with a preferential growth direction.The thickness and roughness of the films were characterized by grazing-incidence x-ray reflectivity (GIXR), and the piezoelectric constant d_{33} was measured by the piezoelectric force microscopy(PFM).The complex refractive indices were measured in the range from 1.5 to 4.2 eV by spectroscopic ellipsometry (SE). The average oscillator strength and its associated wavelength were estimated by using a Sellmeier-type dispersion equation.

EM-ThP-3 The Study of Magnetic and Electrical Properties of Co Spin Crossover Molecule Thin Films*, **Jared Phillips**, S. Yazdani,* Indiana University-Purdue University-Indianapolis*; T. Ekanayaka, E. Mishra,* University of Nebraska*; J. Soruco,* Indiana University-Purdue University-Indianapolis*; A. N'Diaye,* Advanced Light Source, Lawrence Berkeley National Laboratory*; P. Wang,* University of Florida*; M. Shatruk,* Florida State University*; P. Dowben,* University of Nebraska*; R. Cheng,* Indiana University-Purdue University-Indianapolis

Spin crossover complexes (SCO) exhibit a bistability, and can be switched between a low spin and a high spin state via a wide range of external stimuli, including temperature, irradiation and electric field. Accompanying the change in spin state there are often dramatic changes in other physical properties, such as color, magnetic moment, and conductance. A recently synthesized valence tautomeric SCO molecule, [$Co(SQ)_2(3\text{-}tpp)_2$], displays a bistable conductance with a noteworthy low resistance in the high state, making this SCO molecule particularly intriguing for organic device applications. In this work, we detail the temperature, light and voltage dependent conductance properties in the context of the spin state and magnetic field dependent properties of this molecule drawing from results acquired from X-ray absorption spectroscopy (XAS), X-ray magnetic circular dichroism (XMCD), and electronic transport studies. Conductance properties depend on the molecular thin film so we will also discuss the methods and the techniques used to fabricate high quality thin films and the challenges to better thin film growth.

EM-ThP-5 Multi-Frame Gated X-Ray Imager (MGXI) for Fast Hard X-Ray Imaging*, **Mary Ann Mort**, C. Hunt,* University of California at Davis*; A. Carpenter,* Lawrence Livermore National Laboratory

The proposed multi-frame gated x-ray imager (MGXI) is a fast, hard x-ray imaging diagnostic for use in inertial confinement fusion (ICF) and high energy density (HED) experiments at the National Ignition Facility (NIF), such as Compton radiography and hot spot imaging. Individual MGXI component testing is happening in phases at Lawrence Livermore National Lab (LLNL) and the UC Davis Vacuum Microelectronics Lab. The Icarus2 hCMOS sensor was tested with a class 1 laser in both the high speed timing (HST) and manual shutter testing (MST) modes. Microchannel plates (MCPs) will be tested under vacuum with an electron gun and a simple photodiode array. MGXI has goals to image 10-100keV x-rays with 100-1000 ps temporal resolution in 2-8 frames and >5% detector quantum efficiency (DQE).

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