



ICM2018

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21ST INTERNATIONAL CONFERENCE ON MAGNETISM

BOOK OF ABSTRACTS

JULY 15-20, 2018
MOSCONE CENTER
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- U7-06. Magnetic properties of Bis-Lanthanoates.** K. Esien¹, E. McCourt², P. Nockemann² and S. Felton¹ *1. School of Mathematics and Physics, Queen's University Belfast, Belfast, United Kingdom; 2. School of Chemistry and Chemical Engineering, Queen's University Belfast, Belfast, United Kingdom*
- U7-07. Eddy Current Loss Analysis of Underwater Wireless Power Transfer Systems with Misalignments.** Z. Yan¹, Y. Zhang², K. Zhang¹, H. Wen¹, Z. Mao¹ and B. Song¹ *1. School of Marine Science and Technology, Northwestern Polytechnical University, Xi'an, China; 2. Department of Electrical and Computer Engineering, San Diego State University, San Diego, CA, United States*
- U7-08. Magnetoelectric Spin Glass Transition(s) in Pure and Disordered BiFeO₃.** A. Kumar¹ and D. Pandey¹ *1. School of Materials Science and Technology, Indian Institute of Technology (BHU), Varanasi, India*
- U7-09. Relaxation Mechanisms in the Néel Skyrmion Lattice Host GaV₄S₈ Probed by AC Magnetic Response.** E. Clements¹, R. Das¹, G. Pokharel³, D. Mandrus^{3,4}, M. Osofsky², H. Srikanth¹ and M. Phan¹ *1. Department of Physics, University of South Florida, Tampa, FL, United States; 2. Naval Research Laboratory, Washington, DC, United States; 3. Department of Physics & Astronomy, University of Tennessee, Knoxville, TN, United States; 4. Materials Science and Technology Division, Oak Ridge National Laboratory, Oak Ridge, TN, United States*
- U7-10. Magnetic properties of mixed sodium-lithium iron fluorophosphate NaLiFePO₄ F cathode material.** J. Seo¹, H. Choi¹ and C. Kim¹ *1. Department of Physics, Kookmin University, Seoul, The Republic of Korea*
- U7-11. Investigation of spin-orientation in antiferromagnetic ordering for LiFe_{1-x}Zn_xPO₄ with Mössbauer spectroscopy.** H. Choi¹, M. Kim¹ and C. Kim¹ *1. Department of Physics, Kookmin University, Seoul, The Republic of Korea*

THURSDAY
EVENING
5:00

SAN FRANCISCO BALLROOM

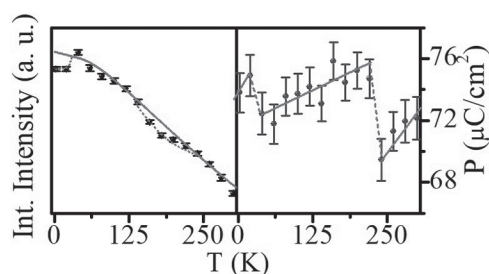
**Session U8
MULTIFERROICS II
(Poster Session)**

Evan Constable, Chair
Technical University Vienna, Vienna, Austria

- U8-01. Multiferroic behavior of Tb₂BaCoO₅ with an exceptionally large magneto-dielectric coupling.** S.K. Upadhyay¹ and E. Sampathkumaran¹ *1. Tata Institute of Fundamental Research, Mumbai, India*

- U8-02. Magnetic Field in Triangular Ising System LuFe₂O₄.** L. Ding¹, F. Orlandi¹, P. Manuel¹, D. Khalyavin¹, A. Boothroyd², D. Prabhakaran² and G. Balakrishnan³ *1. ISIS Facility, Rutherford Appleton Laboratory, Science and Technology Facilities Council, Oxford, United Kingdom; 2. University of Oxford, Oxford, United Kingdom; 3. University of Warwick, Coventry, United Kingdom*
- U8-03. Fabrication of highly qualified (Bi_{1-x}Ba_x)FeO₃ multiferroic thin films by using a pulsed DC reactive sputtering method and demonstration of magnetization reversal by electric field.** S. Yoshimura^{1,2} and M. Kuppan³ *1. Research Center for Engineering Science, Akita University, Akita, Japan; 2. JST-PRESTO, Saitama, Japan; 3. Regional Innovation Center, Akita University, Akita, Japan*
- U8-04. Magnetization curves in magnetoelectric layered structures.** M. Auslender¹ *1. Electrical and Computer Engineering, Ben-Gurion University of the Negev, Beer Sheva, Israel*
- U8-05. Giant magnetic Kerr effect of (Bi_{1-x}La_x)(Fe_{0.75}Co_{0.25})O₃ multiferroic thin films with perpendicular magnetic anisotropy fabricated by a pulsed DC reactive sputtering technique.** M. Kuppan¹ and S. Yoshimura^{2,3} *1. Regional Innovation Center, Akita University, Akita, Japan; 2. Research Center for Engineering Science, Akita University, Akita, Japan; 3. JST-PRESTO, Saitama, Japan*
- U8-06. A New Type II Multiferroic HoFeWO₆.** M. Adnani¹, N. Poudel¹, M.J. Gooch¹, Z. Wu¹, L. Deng¹ and C. Chu^{1,2} *1. Texas Center for Superconductivity and Department of Physics, University of Houston, Houston, TX, United States; 2. Lawrence Berkeley National Laboratory, Berkeley, CA, United States*
- U8-07. Magnetodielectric effect in Eu²⁺ doped BaTiO₃.** K. Rubi¹ and R. Mahendiran¹ *1. Physics Dept, National University of Singapore, West Singapore, Singapore*
- U8-08. Multiferroic Characterization of Single Crystal Samples of Quadruple Perovskite Manganite LaMn₃Mn₄O₁₂.** V. Pascotto Gastaldo^{1,2}, F. Milton¹, A. Gualdi^{2,1}, D. Garcia¹, A. Gauzzi² and A.J. de Oliveira¹ *1. Physics Department, Federal University of São Carlos, São Carlos, Brazil; 2. Institut de Minéralogie, de Physique des Matériaux et de Cosmochimie, Université Pierre et Marie Curie, Paris, France*
- U8-09. Magnetodielectric response and dielectric relaxation mechanism in LiNiO₂ cathode.** S. Dash¹, M. Pradhan¹ and L. Tangi¹ *1. Dept. of Physics and Astronomy, National Institute of Technology, Rourkela, Rourkela, India*
- U8-10. Withdrawn**
- U8-11. Withdrawn**

1. M. Gabay and G. Toulouse, Phys. Rev. Lett. 47, 201 (1981). 2. D. M. Cragg and D. Sherrington, Phys. Rev. Lett. 49, 1190 (1982). 3. D. M. Cragg, D. Sherrington and M. Gabay, Phys. Rev. Lett. 49, 158 (1982). 4. A. Kumar, S. D. Kaushik, V. Siruguri and D. Pandey, Phys. Rev. B 97, 104402 (2018).



Temperature dependence of integrated intensity of the AFM peak and ferroelectric polarization.

U7-09. Relaxation Mechanisms in the Néel Skyrmion Lattice Host

GaV₄S₈ Probed by AC Magnetic Response. E. Clements¹, R. Das¹, G. Pokharel³, D. Mandrus^{3,4}, M. Osofsky², H. Srikanth¹ and M. Phan¹
1. Department of Physics, University of South Florida, Tampa, FL, United States; 2. Naval Research Laboratory, Washington, DC, United States; 3. Department of Physics & Astronomy, University of Tennessee, Knoxville, TN, United States; 4. Materials Science and Technology Division, Oak Ridge National Laboratory, Oak Ridge, TN, United States

The multiferroic lacunar spinel, GaV₄S₈, realizes a Néel skyrmion lattice (SkL) phase below the ferromagnetic Curie temperature, $T_C = 13$ K. Due to a cubic to rhombohedral structural transition [1] at $T_J = 42$ K (JT = Jahn-Teller), the magnetic easy axis is oriented in the direction of rhombohedral distortion along one of four equivalent $\langle 111 \rangle$ directions. Unlike the chiral SkL that exists in the well-studied cubic helimagnets, the Néel SkL can be described as a superposition of spin cycloids. Furthermore, the vortex cores are fixed along the magnetic easy axis. [2] The propagation direction of the incommensurate spin cycloid and SkL is confined within the lamellar ferroelectric domains. Thus, the relaxation dynamics observed in this system are complicated by coexisting magnetic orders and the termination of the spatially-modulated magnetic states at the structural domain boundaries. [3] In this study, we investigate the relaxation mechanisms across the magnetic phase diagram of GaV₄S₈ as a function of temperature and magnetic field. Ac susceptibility measurements are performed for frequencies $f = 11 - 10,000$ Hz, which allow the detection of relaxation phenomena on time-scales ranging from the response of the magnetic superlattice to the moments of the magnetic domains. Particularly, our results allow the refinement of the dynamic response as the magnetic phases evolve from high temperature-information which is typically lost in measurements confined to longer time windows. At low temperature, we investigate the transition between the zero-field spin cycloid and the ferromagnetic ground state. In this regime, the higher harmonic components of the ac magnetic response support the picture of a harmonically-modulated cycloid spin structure which becomes distorted on approaching the ferromagnetic regime. The dynamic results are discussed within the context of canonical chiral magnetic systems.

[1] R. Pocha, et al., Chem. Mater. 12, 2882 (2000). [2] I. Kézsmárki, et al., Nat. Mater. 14, 1116 (2015). [3] Á. Butykai, et al., Phys. Rev. B 96, 104430 (2017).

U7-10. Magnetic properties of mixed sodium-lithium iron fluorophosphate NaLiFePO₄F cathode material. J. Seo¹, H. Choi¹ and C. Kim¹ 1. Department of Physics, Kookmin University, Seoul, The Republic of Korea

The mixed sodium-lithium iron fluorophosphates NaLiFePO₄F have been synthesized by solid-state route. The crystal and magnetic properties were investigated by x-ray diffraction (XRD), vibrating sample magnetometer (VSM), and Mössbauer spectroscopy. Structure refinement of NaLiFePO₄F

was analyzed using Fullprof program. The NaLiFePO₄F was measured by X-ray diffraction (XRD) and was found that the structure of sample was orthorhombic with space group of *Pnma*. Cell parameters of NaLiFePO₄F are as follows: $a_0 = 10.9720$ Å, $b_0 = 6.3616$ Å, $c_0 = 11.4267$ Å, and $V = 797.5837$ Å³. In NaLiFePO₄F, 8d positions are occupied by Na ions only, while 4c sites are occupied both by Na and Li ions. Also, a six-coordinated Fe²⁺ environment is observed in NaLiFePO₄F with distances ranging from 2.079 to 2.173 Å and an average distance of 2.1052 and 2.1266 Å for Fe1 and Fe2, respectively. Temperature dependence of zero-field-cooled (ZFC) and field-cooled (FC) curves was obtained by VSM under 100 Oe from 4.2 to 295 K. We were confirmed the magnetic Néel temperature. Mössbauer spectra of NaLiFePO₄F have been taken at various temperatures ranging from 4.2 to 295 K. The Mössbauer spectra of NaLiFePO₄F compound exhibits doublets with typical for Fe²⁺ in octahedral sites in fluorophosphates.

U7-11. Investigation of spin-orientation in antiferromagnetic ordering for LiFe_{1-x}Zn_xPO₄ with Mössbauer spectroscopy. H. Choi¹, M. Kim¹ and C. Kim¹ 1. Department of Physics, Kookmin University, Seoul, The Republic of Korea

Zn-doped LiFe_{1-x}Zn_xPO₄ ($x=0.1, 0.2, 0.3$, and 0.5) samples were prepared by using the solid-state reaction method. The XRD patterns of samples were analyzed using Fullprof program by Rietveld refinement method. The crystal structure of LiZn_xFe_{1-x}PO₄ were determined to be orthorhombic with space group *Pnma* up to $x=0.3$. The LiZn_xFe_{1-x}PO₄ compounds with $x=0.5$ is a two-phase mixture of the orthorhombic and monoclinic phase. According to the temperature dependence of magnetic susceptibility of LiFe_{1-x}Zn_xPO₄, all samples show antiferromagnetic behaviors. The Néel temperature (T_N) and spin-reorientation temperature (T_S) decrease from 48 K, 14 K at $x=0.1$ to 36 K, 8 K at $x=0.5$ with Zn concentrations. This is due to the Fe-O-Fe superexchange interaction being larger than that of the Fe-O-Mg link. In order to investigate the hyperfine interaction of Fe²⁺ ions in FeO₆ octahedral sites, Mössbauer spectra of LiFe_{1-x}Zn_xPO₄ have been taken at various temperatures from 4.2 to 295 K. The Mössbauer spectra at temperatures below T_N were fitted with eight Lorentzians by diagonalizing the 4x4 magnetic and quadrupole Hamiltonian. The magnetic hyperfine field (H_{hf}) and electric quadrupole splitting (ΔE_Q) values of LiFe_{0.7}Zn_{0.3}PO₄ at 4.2 K were determined to be $H_{hf} = 122.93$ kOe, and $\Delta E_Q = 2.75$ mm/s. The isomer shift (δ) values of the LiZn_xFe_{1-x}PO₄ were between 1.10 and 1.25 mm/s, indicating the ferrous(Fe²⁺) at all temperatures. We have found that Zn ions in LiFe_{0.7}Zn_{0.3}PO₄ induce an asymmetric charge density due to the presence of Zn²⁺ ions at the FeO₆ octahedral sites.