Yu-Miin Sheu
Assistant Professor
SC459, Department of Electrophysics, National Chiao Tung University
1001, Ta Hsueh Rd, Hsinchu 300, Taiwan
Phone: +886-3-571-2121 (ext 56121)
FAX: +886-3-572-5230
E-Mail: ymsheu@nctu.edu.tw

EDUCATION & WORK EXPERIENCE
2014-2015 Postdoctoral research associate, CEMS, RIKEN, Japan
2010-2014 Postdoctoral research associate, CINT, Los Alamos National Lab, USA
2010-2010 Visiting research investigator, The University of Michigan (Ann Arbor), USA
2004-2009 PhD, Department of Physics, The University of Michigan (Ann Arbor), USA

AREAS OF RESEARCH INTEREST AND EXPERIENCE
Ultrafast studies of condensed matter, coherent spin control of novel materials, light-induced novel phenomena, ultrafast energy transfer and relaxation dynamics

Selected publications:
1. Y. M. Sheu, N. Ogawa, Y. Kaneko, and Y. Tokura, "Photocreating supercooled spiral-spin states in a multiferroic manganite", Physical Review B: Rapid Communications 94, 081107(R) (2016).
2. Y. M. Sheu, S. A. Trugman, L. Yan, Q. X. Jia, A. J. Taylor, and R. P. Prasankumar, “Using ultrashort optical pulses to couple ferroelectric and ferromagnetic order in an oxide heterostructure”, Nature Communications 5:5832 (2014).
3. Y. M. Sheu, S. A. Trugman, L. Yan, Q. X. Jia, A. J. Taylor, and R. P. Prasankumar, “Polaronic transport induced by competing interfacial magnetic order in a La0.7Ca0.3MnO3/BiFeO3 heterostructure”, Physical Review X 4, 021001 (2014).
4. Y. M. Sheu, S. A. Trugman, L. Yan, Q. X. Jia, A. J. Taylor, and R. P. Prasankumar, “Photo-induced stabilization and enhancement of the ferroelectric polarization in Ba0.1Sr0.9TiO3 /La0.7Ca(Sr)0.3MnO3 thin film heterostructures”, Physical Review B: Rapid Communications 88, 020101(R) (2013).
5. Y. M. Sheu, Y. J. Chien, C. Uher, S. Fahy, and D. A. Reis, “Free-carrier relaxation and lattice heating in photoexcited bismuth”, Physical Review B 87, 075429 (2013).
6. Y. M. Sheu, S. A. Trugman, Y.-S. Park, S. Lee, H. T. Yi, S.-W. Cheong, Q. X. Jia, A. J. Taylor, and R. P. Prasankumar, “Ultrafast carrier dynamics and radiative recombination in multiferroic BiFeO3”, Applied Physics Letters 100, 242904 (2012).
7. M. Trigo, J. Chen, V. H. Vishwanath, Y. M. Sheu, T. Graber, R. Henning, and D. A. Reis, “Imaging nonequilibrium atomic vibrations with x-ray diffuse scattering”, Physical Review B 82 (23), 235205, (2010).
8. Y. M. Sheu, S. H. Lee, J. K. Wahlstrand, D. A. Walko, E. C. Landahl, D. A. Arms, M. Reason, R. S. Goldman, and D. A. Reis, “Thermal transport in a semiconductor heterostructure measured by time-resolved x-ray diffraction”, Physical Review B 78, 045317, (2008).
9. M. Trigo, Y. M. Sheu, D. A. Arms, J. Chen, S. Ghimire, R. S. Goldman, E. Landahl, R. Merlin, E. Peterson, M. Reason, and D. A. Reis, “Probing unfolded acoustic phonons with x-rays”, Physical Review Letters 101, 025505, (2008). (Selected for a focus in physics)
10. Vladimir A. Stoica, Yu-Miin Sheu, David A. Reis, and Roy Clarke, “Wideband detection of transient solid-state dynamics using ultrafast fiber lasers and asynchronous optical sampling” Optics express 16, 2322, (2008).
I will demonstrate that dynamics of the $ab$-spiral-spin order in a magnetoelectric multiferroic Eu$_{0.55}$Y$_{0.45}$MnO$_3$ (EYMO) can be unambiguously probed through optical second harmonic signal, generated via the spin-induced ferroelectric polarization. In case of relatively weak photoexcitation, the ferroelectric and spiral-spin orders remain interlocked while relaxing through spin-lattice relaxation in the non-equilibrium state. When the additional optical pulse illuminating sample is intense enough to induced local phase transition thermally, the system creates a metastable state of $bc$-spiral-spin order (with electric polarization $P//c$) via supercooling across the first-order phase transition between the $ab$- and $bc$-spiral. The supercooled state of $bc$-spiral spin is formed in thermodynamical ground state of the $ab$-spiral ($P//a$), displaying a prolonged lifetime, in particular under its favorable magnetic field along the $a$-axis. [1] The observed photo-switching between the two distinct multiferroic states sheds light on novel photoinduced phenomena in spiral-spin multiferroics.

Fig1. The two spiral-spin states in a multiferroic manganite EYMO, and the geometry for time-resolved second harmonic generation that creates the metastable $bc$-spiral state. The associated ferroelectric polarizations are also indicated. [2]

Reference:
1. H. Murakawa, H. Murakawa, Y. Onose, F. Kagawa, S. Ishiwata, Y. Kaneko, and Y. Tokura, Phys. Rev. Lett. 101, 197207 (2008).
2. Y. M. Sheu, N. Ogawa, Y. Kaneko, and Y. Tokura, Phys. Rev. B: Rapid Comms. 94, 081107(R) (2016).