



Postdoctoral Opening in the Laboratory for Ultrafast Science University of Tsukuba, Institute of Applied Physics

From April of 2015, I will be opening up a new team dedicated to ultrafast spectroscopy on the fundamental magnetic excitation processes in phase change materials including a topological $[(\text{GeTe})_2(\text{Sb}_2\text{Te}_3)]_n$ superlattice, and coherent control of spin excitations in phase change materials. The time-resolved experiment will be performed by using a near infrared optical pulse with <20 fs duration. I am seeking a highly motivated applicant with experience either in ultrafast laser spectroscopy or magneto-optical Kerr rotation spectroscopy. Experience in ultrafast laser spectroscopy technique is favorable but experimentalist well educated in optics is welcome to apply. This postdoctoral fellowship is supported by JST-CREST grant leading by Prof. J. Tominaga of National Institute of Advanced Industrial Science and Technology, AIST in Japan.

DURATION & HOW TO APPLY: The duration is one year with a possible extension up to a third year, but based on mutual satisfaction. PhD is required. Applicants should submit curriculum vitae, including a list of publications, a brief summary of research interests and two letters of recommendation by January 16, 2015.

Selected examples of our recent research:

- A. V. Kolobov, P. Fons, J. Tominaga, and M. Hase, "Excitation-Assisted Disorder of GeTe and Related Solids with Resonant Bonding", *J. Phys. Chem. C*, Vol. **118**, 10248 (2014).
- P. Fons, P. Rodenbach, K. V. Mitrofanov, A. V. Kolobov, J. Tominaga, R. Shayduck, A. Guissani, R. Calarco, M. Hanke, H. Riechert, R. E. Simpson, and M. Hase, "Picosecond strain dynamics in $\text{Ge}_2\text{Sb}_2\text{Te}_5$ monitored by time-resolved x-ray diffraction", *Phys. Rev. B*, Vol. **90**, 094305 (2014).
- D. Bang, H. Awano, J. Tominaga, A. V. Kolobov, P. Fons, Y. Saito, K. Makino, T. Nakano, M. Hase, Y. Takagaki, A. Guissani, R. Calarco, S. Murakami, "Mirror-symmetric magneto-optical Kerr rotation using visible light in $[(\text{GeTe})_2(\text{Sb}_2\text{Te}_3)]_n$ topological insulators", *Sci. Rep.* Vol. **4**, 5727 (2014).
- M. Hase, M. Katsuragawa, A. M. Constantinescu and H. Petek, "Coherent phonon induced optical modulation in semiconductors at terahertz frequencies", *New Journal of Physics*, Focus on Nonlinear Terahertz studies (invited paper), Vol. **15**, 055018 (2013).
- M. Hase, M. Katsuragawa, A. M. Constantinescu, H. Petek, "Frequency comb generation at terahertz frequencies by coherent phonon excitations in silicon," *Nature, Photonics* Vol. **6**, 243 (2012).
- K. Makino, J. Tominaga, and M. Hase, "Ultrafast optical manipulation of atomic arrangements in chalcogenide alloy memory materials", *Optics Express* Vol. **19**, 1260 (2011).
- M. Hase and M. Kitajima, "Interaction of coherent phonons with defects and elementary excitations", *Journal of Physics: Condensed Matter* (Topical Review), Vol. **22**, 073201 (2010).
- M. Hase, Y. Miyamoto, and J. Tominaga, "Ultrafast dephasing of coherent optical phonons in atomically controlled $\text{GeTe}/\text{Sb}_2\text{Te}_3$ superlattices", *Phys. Rev. B*, Vol. **79**, 174112 (2009).
- J. D. Lee and M. Hase, "Coherent optical control of the ultrafast dephasing of phonon-plasmon coupling in a polar semiconductor using pulse train of below-band-gap excitation", *Phys. Rev. Lett.* Vol. **101**, 235501 (2008).
- J. D. Lee, J. Inoue, and M. Hase, "Ultrafast Fano resonance between optical phonons and electron-hole pairs at the onset of quasiparticle generation in a semiconductor", *Phys. Rev. Lett.* Vol. **97**, 157405 (2006).
- O. V. Misochko, M. Hase, K. Ishioka and M. Kitajima, "Observation of Amplitude Collapse and Revival for Chirped Coherent Phonons in Bismuth", *Phys. Rev. Lett.* Vol. **92**, 197401 (2004).
- M. Hase, M. Kitajima, A. M. Constantinescu, and H. Petek, "The Birth of a Quasiparticle Observed in Time-Frequency Space," *Nature* Vol. **426**, 51 (2003).

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