



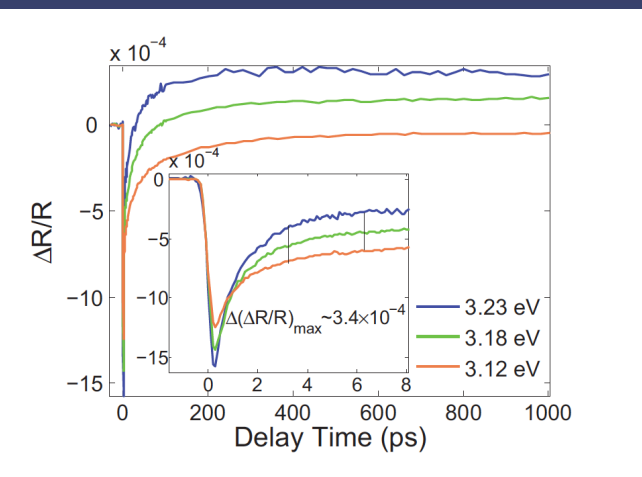
The Integrated Circuit

Science Highlight

Ultrafast carrier dynamics and radiative recombination in multiferroic BiFeO₃

We report a comprehensive study of ultrafast carrier dynamics in single crystals of multiferroic BiFeO₃. Using degenerate femtosecond optical pump-probe spectroscopy, we find that the photoexcited electrons relax to the conduction band minimum through electron-phonon coupling with a ~1 ps time constant that does not significantly change across the antiferromagnetic transition. Electrons subsequently leave the conduction band and primarily decay via radiative recombination on a nanosecond timescale, as supported by photoluminescence measurements. We find that despite the coexisting ferroelectric and antiferromagnetic orders in BiFeO₃, its intrinsic nature results in carrier relaxation similar to that observed in bulk semiconductors.

Full article published in Appl. Phys. Lett. 100, 242904 (2012)
Contact: Rohit Prasankumar



Degenerate pump-probe-reflectivity measurements at 3 different photon energies at room temperature. The inset displays the early time dynamics, with two identical vertical bars that represent the maximum difference between the signals at the highest and lowest pump photon energies. The signals reach their maximum difference at 3 ps.

User Executive Committee

Linda Peteanu, Chair
Carnegie Mellon University
Ed Flynn
Senior Scientific
McGill University
John Grey
University of New Mexico
Diane Lidke
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CINT Contacts

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It has been a busy summer at CINT. The UEC held elections, there are new capabilities being developed, we just finished a round of proposal selections, and we are preparing for the 2012 CINT User Conference.

The User Conference promises to be an engaging event, with Dr Charles Lieber, Dr Oskar Painter and Dr Vicki Colvin leading off as our plenary speakers. There will be a special Nanowire symposium celebrating the contributions to the field of our Chief Scientist, Tom Picraux who is retiring at the end of this year. Registration is open, with free registration for the first 10 poster presenters.

We are also having an image contest to populate our 2013 calendar with your cool science images.

We hope to see you all in Albuquerque in September! And remember that the Fall Call for Proposals deadline is the end of September.

-Heather Brown and Antonya Sanders

Announcements

Image Contest

We have so enjoyed the 2012 Calendar made with CINT images, we have decided to produce another one for 2013. This time, we would like to open the contest up to the CINT User community.

Please send your best image, related to your CINT project, along with a <100 word caption to antonya@lanl.gov. Images will be accepted through **Friday, August 17th**. Winning images will be used in the calendar, and published on the CINT website. Calendars will be distributed at the CINT User Conference. If you would like one and are unable to attend the conference, you can send a request to Antonya and we will mail one to you, as long as supplies last.

Call for Proposals will be open September 1-30, 2012

The **Fall 2012 Call for Proposals** will be open from September 1-30, 2012. Accepted projects will be active from January 1, 2013 – June 30, 2014. All 2011 IA Proposals will be expiring December 30, 2012 and should be renewed during this fall call if the PI wishes to compete for the opportunity to continue work on the project

2011 Annual Report

The CINT 2011 Annual Report is available on the [CINT website](http://cint.lanl.gov). Please check it out to see some of our new capabilities and science highlights.

Publications

If you have any publication or press release from 2012 that resulted from your work at CINT, we need to know. Please send any publication information to cint-pubs@lanl.gov. This is part of your obligation to have access to the CINT facilities.

Acknowledgements

If you are writing a journal article based on part of your work at CINT, we request that you please include us in your acknowledgements. There is suggested wording on the [CINT Publications web page](http://cint.lanl.gov).

CINT User Survey

Have you worked with CINT this past year? If so, please take a minute to [fill out the survey on-line](#).

2012A Proposal Results

For the 2012A round of proposals, we had 102 proposals accepted. From those, 45% were continuations of previous projects, and 55% were new proposals.

CINT User Conference

CINT will be holding the 2012 CINT User Conference on September 18-20, 2012 in Albuquerque, New Mexico. There will be three concurrent symposia:

- Nanoparticle Biocompatibility
- NanoMechanics of Top Down and Bottom Up Nanostructures
- Nanowires

The three plenary speakers are:

- Dr Charles Lieber from Harvard University - Nanowires, Nanoscience and Emerging Nanotechnologies
- Dr Oskar Painter from the California Institute of Technology - Chip-Scale Optomechanics: Towards Quantum Light and Sound
- Dr Vicki Colvin from Rice University - TBA

Register now: <https://cint.newmexicoconsortium.org/>. The hotel block will only be available until August 17.

Job opening at CINT

There is a new job posting for a staff scientist at CINT to conduct original research and support user projects with an emphasis on advanced optoelectronic device design, fabrication and utilization, with a strong emphasis on novel nano/microfabrication. See the [CINT website](http://cint.lanl.gov) for details.

From the Users Executive Committee

We held the UEC election in June. There were 61 users who voted. The three new UEC members are Karen Winey (University of Pennsylvania), Diane Lidke (University of New Mexico) and John Grey (University of New Mexico). Tzu-Ming Lu (Sandia National Laboratory) was elected to the post-doc slot. We sincerely appreciate the efforts of our departing UEC members, Suneel Kodambaka, Dvora Perahia and Elba Serrano.

- Prof. Linda Peteanu, Carnegie Mellon University

New capability

Nanoink Dip-Pen Nanolithography

Dip-Pen Nanolithography is a scanning probe lithography technique where a "tip" (e.g., an AFM tip or tip-array) is used to "write" liquid-phase "inks" onto any substrate with 50 nm to 10 μm resolution. The inks can comprise solutions of self-assembled-monolayer-(SAM) forming molecules, pure liquids, nanoparticles, biomolecules, sol-gel precursors, etc. DPN operates under ambient conditions and is fully compatible with biomolecules, polymers, and quantum nanostructures.

Contact: [Jennifer Hollingsworth](mailto:jennifer.hollingsworth@lanl.gov)

