

JULIAN SWEET

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EMPLOYMENT

Postdoctoral Researcher, Argonne National Laboratory, Center for Nanoscale Materials (2010-present)
Postdoctoral Researcher, University of Arizona, Quantum Nano-optics of Semiconductors group (2009-2010)

EDUCATION

PhD, Optical Sciences, Quantum Nano-optics of Semiconductors (QNOS) Group, Univ. of Arizona,
College of Optical Sciences, Tucson, AZ (2009)
Dissertation: "Radiative Coupling and Decay Properties of Quantum Confined Semiconductors"
Advisor: Hyatt Gibbs

MS, Optical Sciences, Univ. of Arizona, College of Optical Sciences, Tucson, AZ (2006)

MS, Electrical Engineering and Computer Science, UC Santa Barbara,
Department of Electrical Engineering and Computer Science, Goleta, CA (2001)

BS, Electrical Engineering and Computer Science, UC Berkeley,
Department of Electrical Engineering and Computer Science, Berkeley, CA (1996)

CITIZENSHIP

U.S. Citizen

HONORS

Alfred P. Sloan Foundation PhD Fellow (2004-2009)
Arizona University System Technology and Research Initiative (TRIF) Fellow (2007-2008)
Arizona University System Technology and Research Initiative (TRIF) Fellow (2005-2006)

RESEARCH EXPERIENCE

- Nonlinear emission characteristics of Fibonacci quasicrystals
- Time-resolved studies of quantum dot radiative and dephasing lifetimes
- Pump-probe experiment employing optical Stark effect for optical switching
- Characterization of novel MBE-grown compound semiconductor nanostructures, including:
 - Short wavelength, low density InAs on GaAs quantum dots for QED experiments
 - Telecom wavelength GaAlInAs on InP employing AlInAs buffer layer
- Exciton Formation
- Strong coupling between a single quantum dot and a photonic crystal nanocavity
- Characterization of Polarization Mode Dispersion in Optical Fibers

TECHNICAL SKILLS

MATLAB, LABVIEW, Transfer matrix thin film modeling
Spectra Physics femtosecond Tsunami laser, Opal femtosecond OPO
Ultra high vacuum (UHV) system maintenance, liquid Helium temperature experimentation

TECHNICAL SKILLS – cont'd

Delay-line pump-probe apparatus, streak cameras

Single quantum dot micro-photoluminescence apparatus

$g^{(2)}$ photon coherence apparatus

Spectrometer calibration and operation, ultrafast photodetectors, Si single photon counting APDs, diode lasers

Circuit construction, cleanroom work, transmission, reflectivity and absorption experiments, and fiber optics experience

TECHNICAL WRITING

Ford Dissertation Fellowship (Honorable Mention)

Regularly contribute to and review grant funding proposals for QNOS group

PROFESSIONAL AFFILIATIONS

OSA/SPIE Officer, University of Arizona Chapter, 2006-2008

National Science Foundation – CIAN ERC – Student Leadership Council Chair, 2008-2009 (<http://www.cian-erc.org>)

MEETINGS

ETOPIM 8 Rethymnon, Crete June 2009

Montana Meeting on Fundamental Optical Processes in Semiconductors (FOPS), Big Sky, August 2007

APS Division of Laser Science, Tucson, October 2007

APS Division of Laser Science, Tucson, October 2005

Colorado Meeting on Fundamental Optical Processes in Semiconductors, Estes Park, August 2004.

APS Division of Atomic, Molecular and Optical Physics, Tucson, May 2004

MENTORING

Student Leadership Committee, CIAN ERC Project

Co-supervision:

Charles Perkins, Summer REU Student (2009)

Direct Supervision:

Mike Pajor, Implementation of a Hanbury-Brown Twiss Interferometer (2006-2007)

Cory Christenson, Picosecond time-resolved photoluminescence measurements of InAs quantum dots (2006-2007)

JD Olitzky, Characterization of MBE-grown lattice matched GaAlInAs on InP and InAs QDs on GaAs (2008-present)

TALKS

Sweet, J., J. Hendrickson, B. C. Richards, G. Khitrova, A. N. Poddubny, E. L. Ivchenko, M. Wegener, M. Werchner, M. Schafer, M. Kira, S. W. Koch, H. M. Gibbs "Nonlinear Reflectivity of Fibonacci Quantum Wells" ETOPIM 8 2009 Talk by J. Sweet

PUBLICATIONS

Sweet, J., B. C. Richards, J. D. Olitzky, J. Hendrickson, G. Khitrova, H. M. Gibbs, D. Litvinov, D. Gerthsen, D. Z. Hu, D. M. Schaadt, M. Wegener, U. Khankhoje, and A. Scherer, "GaAs photonic crystal slab nanocavities: Growth, fabrication, and photon storage time" (In press, Photonics and Nanostructures, 2009)

Chernikov, A. , S. Horst, S.W. Koch, S. Chatterjee, W. Rühle, J. Sweet, B.C. Richards, J. Hendrickson, G. Khitrova, H.M. Gibbs, D. Litvinov, D.Gerthsen, M. Wegener, "Intra-Dot Relaxation and Dephasing Rates from Time-Resolved Photoluminescence from InAs Quantum Dot Ensembles" SSC 149, 1485-1492 (2009)

Werchner, M., M. Schafer, M. Kira, S. W. Koch, J. Sweet, J. D. Olitzky, J. Hendrickson, B. C. Richards, G. Khitrova, H. M. Gibbs, A. N. Poddubny, E. L. Ivchenko, M. Voronov, and M. Wegener, "One Dimensional Resonant Fibonacci Quasicrystals: Noncanonical Linear and Canonical Nonlinear Effects" Opt. Express 17, 6813-6828 (2009).

Richards, B.C., J. Hendrickson, J. Sweet, G. Khitrova, D. Litvinov, D. Gerthsen, B. Myer, S. Pau, D. Sarid, M. Wegener, E. Ivchenko, A. Poddubny, and H. Gibbs, "Attempts to grow optically coupled Fibonacci-spaced InGaAs/GaAs quantum wells result in surface gratings," Opt. Express 16, 21512-21521 (2008).

Hendrickson, J., B. C. Richards, J. Sweet, G. Khitrova, A. N. Poddubny, E. L. Ivchenko, M. Wegener, and H. M. Gibbs, "Excitonic polaritons in Fibonacci quasicrystals," Optics Express Vol. 16, Iss. 20 pp. 15382-15387 (2008).

Hendrickson, J., B. C. Richards, J. Sweet, S. Mosor, C. Christenson, D. Lam, G. Khitrova, H. M. Gibbs, T. Yoshie, A. Scherer, O. B. Shchekin, and D. G. Deppe, "Quantum dot photonic-crystal-slab nanocavities: quality factors and lasing," Phys. Rev. B **72**,193303 (2005).

Mosor, S., J. Hendrickson, B. C. Richards, J. Sweet, G. Khitrova, and H. M. Gibbs, "Scanning a photonic crystal slab nanocavity by condensation of xenon", Appl. Phys. Lett. 87, 141105 (2005)

Hoyer, W., M. Kira, S. W. Koch, H. Stolz, S. Mosor, J. Sweet, C. Ell, G. Khitrova, H. M. Gibbs, "Entanglement between a Photon and a Quantum Well", Phys. Rev. Lett. 93, 067401 (2004)

CONFERENCE PROCEEDINGS

Hendrickson, J., B. C. Richards, J. Sweet, G. Khitrova, A. N. Poddubny, E. L. Ivchenko, M. Wegener, M. Werchner, M. Schafer, M. Kira, S. W. Koch, H. M. Gibbs, "Optical Properties of 1-D Active Fibonacci Quasicrystals", CLEO/IOEC 2009

Hendrickson, J., B. C. Richards, J. Sweet, C. Christenson, M. Pajor, S. Mosor, G. Khitrova, H. M. Gibbs, T. Yoshie, A. Scherer, O. B. Shchekin, and D. G. Deppe, "Quantum dot photonic crystal nanocavities: Transition from weak to strong coupling and nonlinear emissions", QWD1, QELS-2006.

Hendrickson, J., S. Mosor, B. C. Richards, J. Sweet, G. Khitrova, H. M. Gibbs, T. Yoshie, A. Scherer, O. B. Shchekin, and D. G. Deppe, "Quantum optics in photonic crystal cavities", PQE-2006, Snowbird, Utah, Jan. 2-6. Invited talk by Hendrickson.

Hendrickson, J., S. Mosor, B. C. Richards, J. Sweet, G. Khitrova, H. M. Gibbs, T. Yoshie, A. Scherer, O. B. Shchekin, and D. G. Deppe, "Scanning a photonic crystal slab nanocavity by condensation of xenon for cavity QED experiments", Frontiers in Optics 2005 - 89th OSA Annual Meeting, Tucson, Oct. 16-20, postdeadline talk PDP-A2.

Hendrickson, J., B. Richards, J. Sweet, S. Mosor, G. Khitrova, H.M. Gibbs, T. Yoshie, A. Scherer, O.B. Shchekin, and D.G. Deppe, "Nonlinear emission from a quantum dot photonic crystal slab nanocavity", Semiconductor Laser Workshop @ CLEO, May 27, 2005.

Mosor, S., J. Sweet, B. Richards, G. Khitrova, C. Ell, H. M. Gibbs, W. Hoyer, M. Kira, S. W. Koch, P. Thomas and H. Stolz, "Quantum well interference fringe experiments", Colorado Meeting on Fundamental Optical Processes in Semiconductors, Estes Park, (2004).

Hendrickson, J., B. Richards, J. Sweet, S. Mosor, G. Khitrova, and H. M. Gibbs, "Strong-Coupling and Nonlinear Emission from a Quantum-Dot Photonic-Crystal-Slab Nanocavity", CLEO/QELS Conference (2005)

Sweet, J., J. Hendrickson, B. C. Richards, G. Khitrova, A. N. Poddubny, E. L. Ivchenko, M. Wegener, M. Werchner, M. Schafer, M. Kira, S. W. Koch, H. M. Gibbs, "Nonlinear Reflectivity of Fibonacci Quantum Wells", *The 39th Winter Colloquium on the Physics of Quantum Electronics*, Snowbird, UT. January 2009 (Poster)

Khankhoje, U., A. Scherer, D. Litvinov, D. Gerthsen, M. Wegener, G. Khitrova, J. Sweet, B.C. Richards, J. Hendrickson, H. M. Gibbs, "Fabrication and Characterization of Slab Microcavities", *The 39th Winter Colloquium on the Physics of Quantum Electronics*, Snowbird, UT. January 2009 (Poster)

Richards, B.C., J. Hendrickson, J. Sweet, J. D. Olitzky, G. Khitrova, D. Litinov, D. Gerthsen, B. Myer, S. Pau, D. Sarid, M. Wegener, E. L. Ivchenko, A. N. Poddubny, H. M. Gibbs, "AFM studies of surface grating formation in MBE-grown InGaAs/GaAs multiple quantum well structures", *The 39th Winter Colloquium on the Physics of Quantum Electronics*, Snowbird, UT. January 2009 (Poster)

Sweet, J., C. Christenson, B. C. Richards, J. Hendrickson, G. Khitrova, H. M. Gibbs, A. Scherer, Srinivas Manne, "Photoluminescence Lifetimes of Quantum Dot Ensembles" FOPS 2007 (Poster)

Richards, B.C., J. Hendrickson, J. Sweet, C. Christenson, M. Pajor, D. Lam, G. Khitrova, H. M. Gibbs, A. Scherer and U. Khankhoje, "Emission Characteristics of Quantum Dots in Photonic Crystal Nanocavities", FOPS 2007 (Poster)