Blaise J Thompson

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EDUCATION

University of Wisconsin-Madison 2011 - Present
PhD, Analytical Chemistry Madison WI

→ Researcher in John C. Wright group.
→ Focus on ultrafast materials spectroscopy and instrument development.

Bates College 2007 - 2011
BS, Chemistry; Minor, Philosophy; Concentration: Applying Mathematical Methods Lewiston ME

→ Senior thesis completed in lab of Matthew J. Cote:
Investigations of Plasmon Polaritions with Total Internal Reflection & Atomic Force Microscopy.

EXPERIENCE

John C. Wright Group - ultrafast materials spectroscopy 2011 - Present
Graduate Assistant Madison WI

→ Designed and constructed software tools to collect and process multidimensional spectra
→ Developed novel tools to streamline OPA tuning procedures.
→ Worked in collaboration with Physical and Materials chemists to address challenges in solar energy generation.

Matthew J. Cote Group - microscopy and plasmonics 2009 - 2011
Undergraduate Researcher Lewiston ME

→ Contiguous work for two academic years and intervening summer.
→ Designed and constructed a combined total internal reflection / atomic force microscope.
→ Worked independently and in groups leading other students.
→ Coordinated work with my advisor and other staff and faculty.
→ Wrote a comprehensive thesis on my work.

Michael Dailey Group - neuroscience 2008
Undergraduate Researcher Iowa City IA

→ Dissected and prepared mouse brain samples for in-vivo microglial imaging studies.
→ Trained to utilize confocal microscopy setup.

Peter L. Nagy Group - epigenetics 2007
High School Researcher Iowa City IA

→ Designed and created plasmid, teaching myself from reference materials.
→ Inserted plasmid into yeast.

PUBLICATIONS

5. Horak, Erik H., Rea, Morgan T. Heylman, Kevin D. Gelbwaser-Klimovsky, David, Saikin, Semion K., **Thompson, Blaise J.**, Kohler, Daniel D., Knapper, Kassandra A., Wei, Wei; Pan, Feng; Gopalan, Padama; Wright, John C.; Aspuru-Guzik, Alan; & Goldsmith, Randall H. (2018). Exploring Electronic Structure and Order in Polymers via Single-Particle Microresonator Spectroscopy. *Nano Letters*, in press osf:bs8pr

4. Kohler, D. D., **Thompson, B. J.**, & Wright, J. C. (2017). Frequency-domain coherent multidimensional spectroscopy when dephasing rivals pulsewidth: Disentangling material and instrument response. *The Journal of Chemical Physics*, 147(8), 84202. doi:10.1063/1.4986069 osf:ej2xe

3. Czech, K. J., **Thompson, B. J.**, Kain, S., Ding, Q., Shearer, M. J., Hamers, R. J., Jin, S., & Wright, J. C. (2015). Measurement of Ultrafast Excitonic Dynamics of Few-Layer MoS_2 Using State-Selective Coherent Multidimensional Spectroscopy. *ACS Nano*, 9(12), 12146–12157. doi:10.1021/acsnano.5b05198

2. Fu, Y., Meng, F., Rowley, M. B., **Thompson, B. J.**, Shearer, M. J., Ma, D., Hamers, R. J., Wright J., & Jin, S. (2015). Solution Growth of Single Crystal Methylammonium Lead Halide Perovskite Nanostructures for Optoelectronic and Photovoltaic Applications. *Journal of the American Chemical Society*, 137(17), 5810–5818. doi:10.1021/jacs.5b02651

1. Cabán-Acevedo, M., Kaiser, N. S., English, C. R., Liang, D., **Thompson, B. J.**, Chen, H.-E., Czech, K. C., Wright, J. C., Hamers, R. J., & Jin, S. (2014). Ionization of High-Density Deep Donor Defect States Explains the Low Photovoltage of Iron Pyrite Single Crystals. *Journal of the American Chemical Society*, 136(49), 17163–17179. 10.1021/ja509142w

PRESENTATIONS

4. Presentation, Chaos and Complexity Seminar: "Nonlinear Multidimensional Spectroscopy" 2017. Madison, WI USA PDF

3. Poster, Coherent Multidimensional Spectroscopy": "A Robust, Fully Automated Algorithm to Collect High Quality OPA Tuning Curves" 2016. Groningen, the Netherlands PDF

2. Poster, Midwest Universities Analytical Chemistry Conference": "Utilizing Coherent Multidimensional Spectroscopy to Investigate Nanomaterials for Solar Energy Generation." 2012. Madison, WI USA

1. Poster, Mount David Summit": "Spectroscopic Investigation of Plasmonic Nanoparticles." 2011. Bates College; Lewiston, ME USA

AWARDS & HONORS

Roger Carlson Award 2017

→ Awarded by the University of Wisconsin Chemistry department for excellence in research.

Taylor Teaching Award 2016

→ Selected by University of Wisconsin Chemistry students and Faculty as one of the most outstanding Teaching Assistants of the 2015-2016 School Year.

Rodney F. Johonnot Graduate Award 2011

→ Selected by Bates Faculty as most deserving of aid in furthering his or her studies in professional or postgraduate work.

Bates College Key 2011

→ Awarded by Bates Faculty and staff to 20 students in each graduating class based on academic standing, character, campus and community service, leadership, and future promise.

PROJECTS (SEE MY GITHUB: GITHUB.COM/UNTZAG)

Creator: WrightTools 2014 - Present

Tools for loading, processing, and plotting multidimensional spectroscopy data.

→ Single processing toolkit for wide variety of instrumental data, built to be extensible as more data-types become relevant

→ Offers specialized interactions, such as transformations, that are particularly suited to multidimensional spectroscopy

→ Online documentation through Sphinx and ReadTheDocs

→ Project managed with several graduate student and undergraduate contributors, active issue tracking, version control and an extensive testing suite

→ Central package used as a data management pipeline by other packages simulating and acquiring multidimensional spectra

Creator: PyCMDS 2015 - Present

Unified software for controlling hardware and collecting data in the Wright group.

→ Supplies modular hardware control, calibration, and orchestration during complex, long-lasting CMDS experiments.

→ Provides interface to optomechanical hardware from a variety of manufacturers, including National Instruments, Thorlabs, Horiba, Newport, and Aerotech. Also controls hardware built and customized in-house.

→ Delights users with advanced features such as automatic data backup and notification via Slack.

→ In conjunction with contemporaneous hardware improvements, algorithmic improvements in acquisition strategy **increased scan rate by up to two orders of magnitude** over previous software.

Creator: automated filter wheel assembly 2017

Custom filter wheel hardware, electronics and firmware.

→ Allows for new experimental degrees of freedom within the Wright group.

→ Designed and constructed custom chases in collaboration with the department machine shop.

→ Designed custom circuit board using KiCad, ordered supplies from appropriate online retailers

→ Designed and implemented serial interface and Arduino firmware, including semi-syncronus motion, low-level C++ string processing, and microstepping control for enhanced acquisition time efficiency

Creator: tidy_headers 2017

Rapidly write data from python to plain text, and back again.

→ Dependency of larger projects like WrightTools, and used directly for custom applications.

Founder: WrightSim 2017 - Present

Efficient, flexable simulation package for multidimensional spectroscopy.

→ Uses Liouville's theorem to numerically simulate nonlinear spectroscopy.

→ I was also a principle contributor to the predecessor of WrightSim, NISE.

Contributor: InGaAs array 2015 - 2016

Quickly and cheaply acquire near-infrared pulse spectra.

→ Wrote firmware to handle serial communication between ADC, acquisition software.

→ Used advanced features such as watchdog timers to handle unexpected timing and communication problems.

Contributor: osfclient 2017

A python library and command-line client for file storage on OSF

→ Added Windows functionality, assisted in various debugging efforts in early version of osfcli

TEACHING EXPERIENCE

Fundamentals of Analytical Science 2018
Teaching Assistant, 1 semester UW-Madison

→ Led laboratory and discussion sections.

Graduate Chemical Instrumentation: Design & Control (Electronics) 2017
Teaching Assistant, 1 semester UW-Madison

→ Led laboratory section of course.
→ Assisted students during extended independent instrument design and construction.

Graduate Instrumental Analysis 2012, 2015
Teaching Assistant, 2 semesters UW-Madison

→ Led laboratory section of course.
→ Prepared homework assignments (using Jupyter notebooks for the first time) and led homework review sessions.
→ Lectured in professor's absence.
→ Received competitive departmental Teaching Assistant award.

Undergraduate mentor 2012 - 2013, 2015 - 2017
6 semesters UW-Madison

→ Designed appropriate experiments that were complementary to my own research.
→ Introduced undergraduates to spectroscopy, programming, and instrument design

General Chemistry II 2011, 2012
Teaching Assistant, 2 semesters UW-Madison

→ Coordinated two sections—total of ≈ 50 students in each semester.
→ Led labs.
→ Designed and led discussion sections.

General Chemistry 2010, 2011
Peer Science Leader, 2 semesters Bates College

→ Designed and led class-wide review sessions for General Chemistry.
→ Assisted in first trials of new peer leadership program at Bates College.
→ Attended regular meetings to share teaching strategies with other peer leaders.

SKILLS & SPECIALTIES

Analytical Techniques

→ Spectroscopy: Raman / IR / UV-VIS / NMR
→ Ultrafast Spectroscopy: Pump Probe / CMDS
→ Optomechanical design and construction

Computer Programs & Programming Languages

→ Python (SciPy, PyQT4, PyPI, micropython)
→ git
→ KiCad
→ Anaconda, conda-forge
→ Arduino (Extended C++)
→ LaTeX
→ LabView

SERVICE ACTIVITES & COMMUNITY INVOLVEMENT

Plasma Group Python Introduction 2017
Assistant UW-Madison

→ Helped introduce a group of Faculty and Graduate Students in Physics to Python.
→ Group was switching to Python from IDL.
→ Introduction consisted of weekly meetings across several months.

Pre-college Enrichment Opportunity Program for Learning Excellence (PEOPLE) 2017
Volunteer Madison WI

→ Taught disadvantaged high school students about electronics, science and what it is like to be an analytical chemist.

Wisconsin Middle School Science Bowl 2017
Scientific Judge Madison WI

→ Judged middle school students in statewide science-knowledge competition.
→ Winning team proceeded to national competition.

McElvain Committee 2013 - 2014
Committee Member UW-Madison

→ Graduate student committee to choose seminar speakers.

Freewill Folk Society 2008 - 2011
President Bates College

→ Reorganized club structure, recruited other students to new club positions.
→ Organized monthly folk dances, bringing in bands and callers.

OutFront 2009 - 2010
President Bates College

→ Held weekly meetings, organized social and political events.
→ For the first time, organized and executed collaborative events with other local LGBTQ groups in Lewiston ME.