

Darien J. Morrow

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EDUCATION

University of Wisconsin–Madison

2015 - summer 2020 [anticipated]

PhD: Physical Chemistry. GPA: 4.0/4.0

Madison, WI

- Adviser: John C. Wright.
- Dissertation title [anticipated]: Multidimensional Spectroscopy of Transition Metal Dichalcogenide Nanostructures and Heterostructures

Missouri Western State University

2011-2015

BS (Honors): Chemistry; Minors: Mathematics & Physics. GPA: 4.0/4.0

Saint Joseph, MO

RESEARCH & WORK EXPERIENCE

John C. Wright Research Group

2015 - Present

Graduate Assistant

Madison, WI

- Pioneering spectrally resolved harmonic generation as a probe of semiconductor excited state dynamics
- Using and developing a suite of ultrafast techniques to explore excited state dynamics of thin film semiconductors relevant to photovoltaics (lead halide perovskites and transition metal dichalcogenides)
- Developing open-source software packages for the collection, processing, and modeling of multidimensional spectra (see github.com/wright-group)
- Responsible for maintenance and furtherance of custom ultrafast laser systems including construction of new optomechanical & electronic hardware, training new users, and troubleshooting hardware & software

Christopher G. Elles Research Group

2014

REU Fellow

Lawrence, KS

- Investigated the excited state dynamics of substituted thiophene photo-rearrangement reactions
- Developed and implemented reaction quantum yield measurement technique
- Used ultrafast transient absorption spectroscopy to probe singlet and triplet excited state manifolds

Michael W. Ducey Research Group

2011 - 2012

Undergraduate Assistant

Saint Joseph, MO

- Investigated the solvatochromism of room temperature ionic liquids (RTILs) in common solvents
- Demonstrated the solvents can induce order in the alkyl side chains of methylimidazolium RTILs

Morrow Contracting and Construction LLC

2011 - 2015

Skilled Laborer

Saint Joseph, MO

PUBLICATIONS

In preparation: **Morrow, D. J.**; Kohler, D. D.; Zhao, Y.; Jin, S.; Wright, J. C. Ultrafast manipulation of harmonic generation in transition metal dichalcogenide screw dislocations.

In preparation: Thompson, B. J.; **Morrow, D. J.**; Kain, S.; Sunden, K. F.; Kohler, D. D.; Wright, J. C. Automated OPA tuning and active correction: a case study in enabling multidimensional spectroscopy.

In preparation: **Morrow, D. J.**; Dang, L.; Leng, M.; Lafayette, D. P.; Kohler, D. D.; Zhao, Y.; Jin, S.; Wright, J. C. Measuring second and third harmonic generation in 2D lead iodide perovskites with a multiphoton photoluminescence background.

In preparation: **Morrow, D. J.**; Kohler, D. D.; Zhao, Y.; Jin, S.; Wright, J. C. Pump- triple sum-frequency probe spectroscopy of transition metal dichalcogenides.

In preparation: Hautzinger, M. P.; Pan, D.; Piggs, A. K.; Fu, Y.; **Morrow, D. J.**; Leng, M.; Kuo, M.; Spitha, N.; Lafayette, D. P.; Kohler, D. D.; Wright, J. C.; Jin, S. Effects of A-cation composition on 2D perovskite nanocrystals.

· Code repository: DOI 10.17605/OSF.IO/m9dnw.

5. Thompson, B. J.; Sunden, K. F.; **Morrow, D. J.**; Kohler, D. D.; Wright, J. C. WrightTools: a Python package for multidimensional spectroscopy *The Journal of Open Source Software*. DOI: 10.21105/joss.01141. **2019**.
4. **Morrow, D. J.**; Kohler, D. D.; Czech, K. J.; Wright, J. C. Communication: Multidimensional Triple Sum-Frequency Spectroscopy of MoS₂ and Comparisons with Absorption and Second Harmonic Generation Spectroscopies. *Journal of Chemical Physics*. DOI: 10.1063/1.5047802. **2018**.
 - Preprint: arXiv:1805.06985.
 - Data and code repository: DOI 10.17605/OSF.IO/2WF6G.
3. **Morrow, D. J.**; Kohler, D. D.; Wright, J. C. Group and phase velocity mismatch fringes in triple sum-frequency spectroscopy. *Physical Review A*. DOI: 10.1103/PhysRevA.96.063835. **2017**.
 - Preprint: arXiv:1709.10476.
 - Data and code repository: DOI 10.17605/OSF.IO/EMGTA.
2. Fu, Y.; Rea, M. T.; Chen, J.; **Morrow, D. J.**; Hautzinger, M. P.; Zhao, Y.; Manger, L. H.; Wright, J. C.; Goldsmith, R. H.; Jin, S. Selective Stabilization and Photophysical Properties of Metastable Perovskite Polymorphs of CsPbI₃ in Thin Films. *Chem. Mater.* DOI: 10.1021/acs.chemmater.7b02948. **2017**.
1. Chen, J.; **Morrow, D. J.**; Fu, Y.; Zheng, W.; Zhao, Y.; Dang, L.; Stolt, M. J.; Kohler, D. D.; Wang, X.; Czech, K. J.; Hautzinger, M. P.; Shen, S.; Guo, L.; Pan, A.; Wright, J. C.; Jin, S. Single-Crystal Thin Films of Cesium Lead Bromide Perovskite Epitaxially Grown on Metal Oxide Perovskite (SrTiO₃). *J. Am. Chem. Soc.* DOI: 10.1021/jacs.7b07506. **2017**.
 - Data and code repository: DOI 10.17605/OSF.IO/V5KZN.

PATENTS

U.S. Patent Pending, filed 2019-06-20 **Morrow, D. J.**; Kohler, D. D.; Wright, J. C. Ultrafast, multiphoton-pump, multiphoton-probe spectroscopy.

POSTERS & PRESENTATIONS

- Poster. **Darien J. Morrow**, Daniel D. Kohler, John C. Wright. Multi-photon pump, multi-photon probe spectroscopies and their application to MX₂ nanostructures. CMDS 2018, Seoul, South Korea. June 2018.
- Poster. **Darien J. Morrow**, Jenna M. Wasylenko, Christopher G. Elles. Kinetics and Dynamics of the Photorearrangement Reactions of Aryl-Substituted Thiophenes. ACS National Meeting, Denver, CO. March 2015.
- Poster. Michael W. Ducey, **Darien J. Morrow**, Bethany Thornton, Varun Lahoti. Conformational behavior and applications of mixed room temperature ionic liquid solvent systems examined with a panel of solvatochromic probes. ACS Midwest Regional Meeting, Columbia, MO. November 2014.
- Poster. **Darien J. Morrow**, Jenna M. Wasylenko, Christopher G. Elles. Kinetics and Dynamics of the Photorearrangements of Conjugated Thiophenes. Council on Undergraduate Research, Research Experiences for Undergraduates Symposium, Arlington, VA. October 2014.
- Poster. Melanie Edlin, David J. Freeman, Nathan Harms, Xu Ho, Torin McKinley, Alexander Moore, **Darien J. Morrow**, Christopher Phillips, Jeffrey N. Woodford, Determination of Dimerization Constant of N-(isoquinolin-3-yl)Benzamide and N-(isoquinolin-2-yl)Benzamide. ACS Midwest Regional Meeting, Springfield, MO. October 2013.

TEACHING EXPERIENCE

Physical Chemistry: Thermodynamics

Teaching Assistant for Prof. Gilbert M. Nathanson

Fall 2016

Madison, WI

General Chemistry

Teaching Assistant for Prof. Ive Herman and Dr. Paul Hooker

Fall 2015 - spring 2016

Madison, WI

Organic Chemistry II

Teaching Assistant for Prof. Steven P. Lorimor

Fall 2013

Saint Joseph, MO

FELLOWSHIPS & SCHOLARSHIPS

- Link Foundation Energy Fellowship. July 2018 - June 2020.
Two year full stipend for *Investigation of Coherent Charge Transfer in Transition Metal Dichalcogenide Heterostructures with Multiresonant Coherent Multidimensional Spectroscopy*.
- Pei Wang Fellowship. Fall 2015 - spring 2016.
- Golden Griffon Honors scholarship. Fall 2011 - spring 2015.
- NSF funded Midwest Apex Project scholarship. Fall 2011 - spring 2015.
- Missouri Bright Flight scholarship. Fall 2011 - spring 2015.

AWARDS & HONORS

- Roger Carlson Award for Excellence in Analytical Chemistry. 2018.
- NSF Graduate Research Fellowship Program, Honorable mention. 2017.
- MWSU Department of Chemistry, Edgar C. Little Outstanding Student Award. 2015.
- ACS Division of Analytical Chemistry, Undergraduate Award in Analytical Chemistry. 2015.
- ACS Division of Inorganic Chemistry, Undergraduate Award in Inorganic Chemistry. 2013.
- MWSU President's Honor's List. Fall 2011 - spring 2015.

SOFTWARE SKILLS

- Python and the scientific Python software stack (numpy, matplotlib, scipy, h5py)
- Working knowledge: Arduino, Git, Latex, Autodesk Inventor
- Active contributor/maintainer of open source projects:

- WrightTools (library): loading, processing, and plotting of multidimensional spectroscopy data
- PyCMDS (application): orchestrating many hardware into multidimensional spectrometers
- attune (library): tuning/calibrating multidimensional spectrometers

SERVICE ACTIVITIES & COMMUNITY INVOLVEMENT

- Organized weekly seminar for physical chemistry graduate students to present their research to fellow graduate students. 2018-2019
- Served as a moderator for the annual Wisconsin Middle School Science Bowl (sponsored by the DOE). 2017-present.
- Wisconsin Institute for Discovery volunteer. 2017-present.
- Taught/supervised electronics for a week to high schoolers in the PEOPLE program. Summer 2017.
- Served on panel to talk to REU students about experiences applying to and surviving graduate school. Summer 2017.
- Talked and demonstrated to Institute of Chemical Education summer camp attendees about my research, renewable energy, and how solar cells work. Summer 2017.
- Served as vice-president (2014-2015) and member of Missouri Western State University's ACS affiliated Chemistry club. 2011-2015.
- Aided in the organization and implementation of Super Science Saturday and Chemathon at Missouri Western State University. 2011-2015.

REFERENCES

- Prof. John C. Wright | wright@chem.wisc.edu | 608-262-0351
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- Prof. Christopher G. Elles | elles@ku.edu | 785-864-1922
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