

## Contact

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## Skills

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**Techniques** - Ellipsometry, atomic force microscopy, X-ray diffraction, electronic device characterization, UV-Vis spectrometry, transient fluorescence, optical microscopy, physical vapor deposition

**Equipment** - lock-in amplifier, pulse generator, oscilloscope, source measure unit, spectrometer, pulsed and CW lasers, Arduino, cryostat

**Programming** - Python, MATLAB, LabView, GUI development, National Instruments VISA, Git, MongoDB, Image Processing, Optical modeling

## Leadership and Outreach

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### Research Mentor

UMN and MSU | 2014 - Present

Mentored one graduate student, four undergraduates, and two high school students, leading to contributions in four publications

### Science Fair Mentor

Minnesota Academy of Science  
Bdote Middle School | Fall 2018

### Workshop Volunteer

Minnesota Tool Library  
May 2017 - Present

### Student Chapter President

Engineers Without Borders, MSU  
May 2014 - May 2015

# John Bangsund

## Optical and Electronic Materials Scientist

## About

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I am an optical and electronic materials scientist with eight years of laboratory experience in photovoltaics and LEDs. I develop software and hardware which enable new measurement techniques and improved data analysis. During my PhD work, I have applied these new techniques to better understand degradation mechanisms in organic LEDs.

## Education

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### University of Minnesota

Ph.D. Materials Science | GPA: 3.9 | Expected May 2020

National Science Foundation Graduate Research Fellowship (2015-2020)

### Michigan State University

B.S. in Materials Science & Engineering | GPA: 4.0 | May 2015

Concentration in Polymer Science, B.A. in Humanities, Minor in Spanish  
Goldwater Scholarship (2014), Alumni Distinguished Scholarship (2011-2015)

## Work Experience

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### Graduate Research Fellow

University of Minnesota | Advised by Prof. Russell Holmes | Nov. 2015 - Present

- Collaborated with DuPont to characterize OLED degradation and understand stability differences between proprietary host materials
- Developed techniques based on optical probes to quantify the pathways of OLED degradation, such as changes in quantum yield and excited state kinetics
- Implemented image analysis techniques to study crystallization and pattern formation in organic thin films
- Designed hardware and software for automation of device lifetime testing
- Helped build and maintain database for test data storage and analysis
- Managed laboratory equipment maintenance on deposition system, vacuum pumps, and gloveboxes
- Wrote open-source Python programs for automating data acquisition with common lab hardware, calculating OLED light outcoupling efficiency, and measuring crystal growth rate

### Ellipsometry Technician

UMN Characterization Facility | Minneapolis, MN | Oct. 2016 - Present

- Trained over 40 new users in theory and the principles of operation
- Maintained instrument and assisted industry partners in sample analysis
- Gave workshop presentations and demos to industry partners

### Undergraduate Research Assistant

Michigan State University | Advised by Prof. Richard Lunt | Aug. 2012 - July 2015

Initiated and led a project on near-infrared absorbers for organic photovoltaics which resulted in a licensed patent and three journal publications.

## Teaching Experience

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- **Discussion Instructor**, Introduction to Materials Science, University of Minnesota, Fall 2018 (*Outstanding TA Award*)
- **Lead Teaching Assistant**, Materials Properties Lab, University of Minnesota, Spring 2018 (*Outstanding TA Award*)
- **Teaching Assistant**, Thermodynamics of Materials, University of Minnesota, Fall 2016

## Publications

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- 10 R Newcomb, **JS Bangsund**, *et al.* Role of Excimer Formation in Degradation of Organic Light-Emitting Devices. *Submitted*.
- 9 **JS Bangsund** and Russell J. Holmes. Assessing Bimolecular Quenching During Operation of Organic Light-Emitting Devices. *In prep*.
- 8 **JS Bangsund** and Russell J. Holmes. Impacts of Degradation on Annihilation and Efficiency Roll-Off in Organic Light-Emitting Devices. *Proc. of SPIE*. (2019). *Submitted*.
- 7 **JS Bangsund**, *et al.* Spontaneous Formation of Aligned, Periodic Patterns During Crystallization of Organic Semiconductor Thin Films. *Nature Materials* (2019). DOI: 10.1038/s41563-019-0379-3
- 6 **JS Bangsund**, *et al.* Improved Stability in Organic Light-Emitting Devices by Mixing Ambipolar and Wide Energy Gap Hosts. *Journal of the Society for Information Display* (2019). DOI: 10.1002/jsid.761
- 5 **JS Bangsund**, *et al.* Origin of Lifetime Enhancement in Mixed Emissive Layer Organic Light-Emitting Devices. *ACS Applied Materials and Interfaces* (2018). DOI: 10.1021/acsami.7b16643
- 4 KW Hershey, **JS Bangsund**, *et al.* Decoupling Degradation in Exciton Formation and Recombination During Lifetime Testing of Organic Light-Emitting Devices. *Applied Physics Letters* (2017). DOI: 10.1063/1.4993618
- 3 CJ Traverse, M Young, **JS Bangsund**, *et al.* Anions for Near-Infrared Selective Organic Salt Photovoltaics. *Scientific Reports* (2017). DOI: 10.1038/s41598-017-16539-3
- 2 M Young, **JS Bangsund**, *et al.* Organic Heptamethine Salts for Photovoltaics and Detectors with Near-Infrared Photore-sponse up to 1600 nm. *Advanced Optical Materials* (2016). DOI: 10.1002/adom.201600102
- 1 **JS Bangsund**, *et al.* Organic Salts as a Route to Energy Level Control in Low Bandgap, High Open-Circuit Voltage Organic and Transparent Solar Cells that Approach the Excitonic Voltage Limit. *Adv. En. Mat.* (2016). DOI: 10.1002/aenm.201501659

## Conference Presentations

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- 5 **JS Bangsund**, *et al.* Impacts of Degradation on Annihilation and Efficiency Roll-off in Organic Light-Emitting Devices. Oral Presentation. SPIE Organic Electronics + Photonics, San Diego, CA. 08/2019.
- 4 **JS Bangsund**, *et al.* Spontaneous Formation of Aligned, Periodic Patterns During Crystallization of Organic Semiconductor Thin Films. Poster Presentation. Materials Research Society Fall Meeting, Boston, MA. 11/2018.
- 3 **JS Bangsund**, *et al.* Quantifying Multiple Active Degradation Mechanisms in Mixed Host Organic Light-Emitting Devices. Oral Presentation. Materials Research Society Spring Meeting, Phoenix, AZ. 4/2018.
- 2 **JS Bangsund**, *et al.* Understanding Improved Lifetime in Mixed Emissive Layer Organic Light-Emitting Devices. Oral Presentation. Optical Society of America Solid-State Lighting Meeting, Boulder, CO. 11/2017.
- 1 **JS Bangsund**, *et al.* Energy Level Control in Organic Salts for Efficient, Deep Near-Infrared Organic and Transparent Photovoltaics. Oral Presentation. Materials Research Society Spring Meeting, Phoenix, AZ. 3/2016.

## Patents

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- RR Lunt, **JS Bangsund**, M Young, and CJ Traverse. *ORGANIC SALTS FOR HIGH VOLTAGE ORGANIC AND TRANSPARENT SOLAR CELLS*. PCT/US2016/026169. April, 2016. *Licensed by Ubiquitous Energy*.

## Interests

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Woodworking, gardening, bouldering, backpacking, biking, saxophone, jazz, and creative writing