

# JOHN BANGSUND

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## PROFILE

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Optoelectronic device engineer with eight years of laboratory research experience:

- Lead three collaborative projects on near-infrared absorbing organic solar cells, stability of organic light-emitting devices (OLEDs), and pattern formation during thin film crystallization of organic semiconductors
- Extensive experience with electrical, optical, and materials characterization techniques
- Developed MATLAB and Python programs for image analysis, database management, data acquisition and measurement automation, and optical modeling

## EDUCATION

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<b>University of Minnesota</b>	Expected Summer 2020
Ph.D. in Materials Science & Engineering, Holmes Research Group	GPA: 3.9
Award: National Science Foundation Graduate Research Fellowship (2015-2020)	
<b>Michigan State University</b>	May 2015
B.S. in Materials Science and Engineering, Concentration in Polymer Science	GPA: 4.0
B.A. in Humanities and Minor in Spanish	
Awards: Goldwater Scholarship (2014), Alumni Distinguished Scholarship (2011-2015)	

## WORK EXPERIENCE

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<b>University of Minnesota</b>	Nov. 2015 - Present
Graduate Research Assistant, advised by Prof. Russell J Holmes	Minneapolis, MN
<ul style="list-style-type: none"><li>· Collaborated with The Dow Chemical Company to characterize OLED degradation and understand stability differences between proprietary host materials</li><li>· Co-developed techniques based on photoluminescence probes to deconvolute the components of OLED efficiency degradation, such as changes in emitter quantum yield and excited state quenching kinetics</li><li>· Co-wrote software and designed hardware for automation of device lifetime testing</li><li>· Helped build and maintain database for test data storage and analysis</li><li>· Implemented image analysis techniques to study crystallization and pattern formation in organic thin films</li><li>· Improved understanding of how crystallization in organic thin films can be engineered to achieve large grains</li></ul>	
<b>University of Minnesota Characterization Facility</b>	2016 - Present
Ellipsometry Technician	Minneapolis, MN
<ul style="list-style-type: none"><li>· Maintained instrument and trained over 40 new users in theory and the principles of operation</li><li>· Assisted industry partners in sample analysis</li><li>· Gave workshop presentation and demo to industry partners (IPRIME mid-year workshops)</li></ul>	
<b>Michigan State University</b>	Aug. 2012 - July 2015
Undergraduate Research Assistant, advised by Prof. Richard R Lunt	East Lansing, MI
<ul style="list-style-type: none"><li>· Initiated and managed collaborative project on near-infrared absorbers for organic photovoltaics (OPVs) which resulted in a licensed patent and three journal publications</li><li>· Performed anion exchange and column chromatography to synthesize a new series of ionic organic donor materials</li><li>· Discovered that anions can shift frontier energy levels, improving open-circuit voltage of small bandgap OPVs</li></ul>	

## TECHNICAL STRENGTHS

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<b>Techniques</b>	Ellipsometry, atomic force microscopy, X-ray diffraction, electronic device characterization, UV-Vis spectrometry, transient fluorescence, optical microscopy, physical vapor deposition
<b>Equipment</b>	lock-in amplifier, source meter, spectrometer, Arduino, frequency generator, oscilloscope, pulsed and CW lasers, cryostat
<b>Programming</b>	Optical modeling, Python, MATLAB, LabView, GUI development, National Instruments VISA, MongoDB, Image Processing, Arduino, GitHub

## LEADERSHIP AND OUTREACH

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### University of Minnesota and Michigan State University

2014 - Present

Research Mentor

- Mentored and managed one graduate student, four undergraduates, and two high school students
- Trained students in a variety of lab techniques and data analysis, leading to contributions in four publications

### Minnesota Academy of Science, Bdote Middle School

Fall 2018

Science Fair Mentor

- Mentored four middle school students developing science fair projects, 4 hr/wk over 12 week program

### Minnesota Tool Library, Northeast Minneapolis

2017 - Present

Volunteer, Local Advisory Board Member

- Volunteered weekly, helping with tool maintenance, shop organization, and event planning

### Engineers Without Borders, MSU Student Chapter

2011 - 2015

President (2014-2015), International Project Lead (2013-2014), Fundraising Chair (2012-2014)

- Managed chapter of 40 members, supervising local and international volunteering projects
- Coordinated design, fundraising, report writing, and planning for two international projects
- Served as Spanish translator on two international trips, helping to construct 14 composting latrines

## JOURNAL PUBLICATIONS

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- 8 **JS Bangsund**, *et al.* Assessing Bimolecular Quenching During Operation of Organic Light-Emitting Devices. In preparation.
- 7 **JS Bangsund**, *et al.* Spontaneous Formation of Aligned, Periodic Patterns During Crystallization of Organic Semiconductor Thin Films. *Nature Materials* (2019).
- 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).
- 5 **JS Bangsund**, *et al.* Origin of Lifetime Enhancement in Mixed Emissive Layer Organic Light-Emitting Devices. *ACS Applied Materials and Interfaces* (2018).
- 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).
- 3 CJ Traverse, M Young, **JS Bangsund**, *et al.* Anions for Near-Infrared Selective Organic Salt Photovoltaics. *Scientific Reports* (2017).
- 2 M Young, **JS Bangsund**, *et al.* Organic Heptamethine Salts for Photovoltaics and Detectors with Near-Infrared Photoresponse up to 1600 nm. *Advanced Optical Materials* (2016).
- 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).

## CONFERENCE PRESENTATIONS

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- 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