

# KYLE W. HERSHEY

2296 Long Avenue ♦ Saint Paul, MN 55114  
(608) · 345 · 8595 ♦ kwhershey@gmail.com

## SUMMARY OF QUALIFICATIONS

---

- Ph. D in Materials Science & Engineering (Expected Summer 2018)
- Extensive experience in the fabrication and characterization of thin films via solution and vapor deposition methods
- Testing and Analysis of Organic Light-Emitting Devices (OLEDs) along with failure analysis
- Specific expertise in characterization of kinetic processes of electronic species within OLEDs in the transient, steady-state and operational lifetime regimes
- Primary hardware and software designer for multiple permanent laboratory equipment apparatuses
- Experience implementing software control of testing equipment along with database design for data management
- Strong leader with experience in mentoring and financial management

## EDUCATION

---

<b>University of Minnesota</b> Ph.D. in Materials Science & Engineering <i>Transient and Operational Lifetime Dynamics of Organic Light Emitting Devices (OLEDs)</i> Holmes Research Group GPA: 3.545	Expected Summer 2018
<b>Coe College</b> B.A.s in Physics, Mathematics, and Computer Science GPA: 3.927	June 2013

## RESEARCH EXPERIENCE

---

<b>University of Minnesota, Materials Science &amp; Engineering</b> <i>Graduate Student, supported via UMN-Dow Chemical University Partnership Initiative</i>	July 2013-Present Minneapolis, MN
<ul style="list-style-type: none"><li>· <i>Transient and Operational Lifetime Dynamics of Organic Light Emitting Devices (OLEDs)</i></li><li>· Explored methods of enhancing device efficiency and lifetime through an improved understanding of dynamic processes and novel experimental techniques</li><li>· Fabrication and characterization of OLEDs at transient, steady-state, and lifetime timescales</li><li>· Actively collaborated with the Dow Chemical Company as an industrial sponsor in order to provide methods of understanding device and chemical behavior of materials of interest</li><li>· Theoretical, hardware and software development for novel OLED lifetime testing setup, as well as multiplexing to eight simultaneous devices.</li><li>· Created permanent hardware setups for transient photoluminescence and electroluminescence studies</li><li>· Model development for fitting experimental data of transient and steady-state electroluminescence</li><li>· Software development and hardware automation for device testing and analysis</li><li>· Database setup for storing test data and data analysis</li><li>· Maintain active code repository for testing and analysis software using Github, featuring over 13,000 lines of code</li><li>· Extensive use of software connection to testing equipment including source-measure units, spectrometers, and custom microprocessor board based electronics</li></ul>	
<b>Northwestern University, Materials Science/Chemistry</b> <i>REU Student, Prof. George Schatz, Chemistry</i>	June 2012 - August 2012 Evanston, IL
<ul style="list-style-type: none"><li>· <i>Field Enhancement Due to Plasmonic Nanostructures</i></li><li>· Computational simulation of electromagnetic field enhancement near the surface of gold cylindrical dimers</li><li>· Finite-difference time domain method simulation (FDTD) with periodic boundary conditions</li><li>· Cluster computing on Northwestern's high performance computing system - <i>Quest</i></li></ul>	
<b>Rockwell Collins, Inc., Advanced Technology Center</b> <i>Summer Intern</i>	June 2011-August 2011 Cedar Rapids, IA

- *Microelectronics die attach process development*
- Developed and characterized methodology for attaching microelectronics using various techniques for low stand-off applications
- Composed internal documentation on No Clean microelectronics die attachment and Transient Liquid Phase bonding

#### **Coe College**

*REU Student, Prof. James Cottingham, Coe College, Physics*

June 2010-August 2010

*Cedar Rapids, IA*

- Examined the effects of the vibrations in the pipe walls of free-reed wind instruments
- Materials measurements of density and Young's modulus of bamboo pipes
- Theoretical modeling of vibraional modes with Matlab and Mathematica

### **TECHNICAL STRENGTHS**

<b>Analytical Techniques</b>	Ellipsometry, Electronic Device Characterization, UV/Visible Spectrometry, Transient exciton lifetime measurements (electrically and optically pumped), OLED lifetime characterization, Scanning Electron Microscopy (SEM), Optical Microscopy, Optical Field Modeling, Transfer Matrix Formalism, Finite Difference Time Domain (FDTD) Modeling, Transient Liquid Phase (TLP) bonding, AuSn eutectic bonding, solder bumping, Ball Grid Array (BGA) attachment, cross sectional die analysis
<b>Lab Equipment</b>	Thermal evaporation vacuum chamber, glovebox, spin coater, UV ozone, sonicator, pulse generator, impedance spectrometer, frequency generator, optical microscope, SEM, ellipsometer, oscilloscope, FFT audio spectrometer, probe station, cryogenic probe station, source meter, spectrometer, Arduino, Pulsed and CW lasers, Class 10000 clean room, chip bonder, wire bonding, stud bumping, plating baths
<b>Software</b>	Matlab, Mathematica, Anaconda, Autodesk Inventor, AutoCAD, Solidworks, OriginLabs, ChemDraw, Powershell, Microsoft Office Suite, Github, KiCAD, L <sup>A</sup> T <sub>E</sub> X, Linux(Ubuntu, Debian, Red Hat, Arch) Vim, SSH, SCP, VNC, Bash
<b>Programming</b>	Python, C, C++, C#, Objective C, Matlab, Tk graphics, National Instrument VISA command library, HTML, PHP, MongoDB, SQLite, SQL, Plotly, Matplotlib

### **LEADERSHIP EXPERIENCE**

<b>Holmes Group Purchasing Officer</b> <i>University of Minnesota</i>	2016-Present
--	--------------

- Served as group purchasing officer, responsible for handling all purchases less than \$500
- Regular interaction with the Accounting Office to process transactions
- Weekly transaction accounting and justification

<b>Mentor of Undergraduate and High School Research Students</b> <i>University of Minnesota</i>	2016-present
--	--------------

- Primary contact for Undergraduate student working on developing new technique for solution lifetime measurements
- Oversaw two high school students in creating organic lasers for a summer research experience project
- Taught advanced research topics at basic level to enable understanding of lab work

<b>Executive Board Member</b> <i>Coe College Physics</i>	2011-2013
---	-----------

- **Physics Club:** Treasurer (2011), Vice President (2012)
- **Society of Physics Students:** President (2012-2013)
- Assisted in organization of *Playground of Science*, an annual outreach event for over 1,000 elementary school students
- Represented Physics Club at annual student activities committee budget meeting. Physics Club had the largest budget of any student group, with an annual budget over \$ 4,000.
- Defended Physics Club at special budgetary meetings which succeeded in funding over 30 students to attend the 2012 Sigma Pi Sigma Quadrennial Congress, the largest group Coe College has ever sent.
- Represented the Society of Physics Students chapter at the 2012 Sigma Pi Sigma Quadrennial Congress

**Senior Patrol Leader, Boy Scouts of America**

2006

*Troop 46 Glendale, AZ*

- Organized and led weekly troop meetings focusing on important life skills ranging from First Aid to wilderness skills to finance
- Organized monthly camping trips for scouts and parents
- Maintained order in a group of 30 children

**TEACHING EXPERIENCE**

---

**Teaching Assistant, Senior Design**

2017

*University of Minnesota*

- Oversaw over 30 students working in groups with industrial partners designing solutions to commercially relevant problems
- Assisted in idea generation, design specification, technical calculations and financial analysis
- Evaluated biweekly presentation and written reports of projects
- Responsible for assisting students and grading

**Teaching Assistant, Materials Performance**

2015

*University of Minnesota*

- Ran two laboratory sections every week, seeing 30 students
- Oversaw laboratory experiments for thermal and mechanical characterization, including thermal stress, creep, fatigue and stress-strain testing
- Responsible for assisting students and grading

**Tutor**

2010-2013

*Coe College*

- Tutored multiple students in Physics, Math, and Computer Science
- Individual weekly tutoring sessions for at least two students per semester
- Senior Year, ran weekly math department open office hours, one night per week. Open to all students in any math class on campus

**HONORS**

---

- Eagle Scout (2008)
- Dean's List, Coe College (2009-2013)
- Member of Sigma Pi Sigma Physics Honors Society (Inducted 2013)
- Member of Phi Beta Kappa (Inducted 2013)
- Member of the Materials Research Society (2016-Present)
- University of Minnesota College of Science and Engineering Fellowship (2013-2014)

**PUBLICATIONS AND PRESENTATIONS**

---

**Journal Publications**

- J Bangsund, **KW Hershey**, RJ Holmes. *Johns Paper*
- **KW Hershey**, G Qian, RJ Holmes. *Decoupling Degradation in Exciton Formation and Recombination During Lifetime Testing of Organic Light-Emitting Devices*. Applied Physics Letters. *Submitted*
- F Xu, **KW Hershey**, RH Holmes, TR Hoyer. *Blue-Emitting Arylalkynyl Naphthalene Derivatives via a Hexadehydro-Diels-Alder Cascade Reaction*. Journal of the American Chemical Society 138 (39), 12739-12742
- **KW Hershey**, RJ Holmes. *Unified Analysis of Transient and Steady-State Electrophosphorescence Using Exciton and Polaron Dynamics Modeling*. Journal of Applied Physics 120 (19), 195501
- **KW Hershey**, JP Cottingham. *Material Properties of Pipes of Reeds From the Southeast Asian Khaen*. Journal of the Acoustics Society of America, 129 (4) 2520

**Oral Presentations**

- **KW Hershey**, RJ Holmes. *Decoupling Exciton Formation and Recombination Losses in Organic Light-Emitting Devices During Lifetime Testing*, Optical Society of America - Solid State Lighting Meeting. Boulder, CO. November 2017

- **KW Hershey**, RJ Holmes. *Decoupling Degradation Mechanisms During Lifetime Testing of Organic Light-Emitting Devices*, UMN IPrime. Minneapolis, MN. June 2017
- **KW Hershey**, RJ Holmes. *Modeling Exciton and Polaron Dynamics to Analyze OLED Behavior*, UMN IPrime. Minneapolis, MN. June 2016
- **KW Hershey**, RJ Holmes. *Modeling Exciton and Polaron Dynamics to Analyze OLED Behavior*, MRS Spring Conference. Phoenix, AZ. April 2016
- **KW Hershey**, JP Cottingham. *Material Properties of Pipes and Reeds from the Southeast Asian Khaen*, Acoustical Society of America National Meeting. Seattle, WA. May 2011

#### **Poster Presentations**

- **KW Hershey**, RJ Holmes. *Decoupling Degradation Mechanisms During Lifetime Testing of Organic Light-Emitting Devices*, UMN IPrime. Poster. Minneapolis, MN. June 2017
- **KW Hershey**, RJ Holmes. *Connecting Transient and Steady-State Dynamics in Organic Light Emitting Devices*, UMN IPrime. Poster. Minneapolis, MN. June 2016
- **KW Hershey**, RJ Holmes. *Transient Analysis of Organic Light-emitting Devices*, UMN IPrime. Poster. Minneapolis, MN. May 2015
- **KW Hershey**, JP Cottingham. *Material Properties of Pipes and Reeds from the Southeast Asian Khaen*, Sigma Pi Sigma Quadrennial Physics Congress. Poster. Orlando, FL. 2012.