J. WILLIAM BOLEY
Curriculum Vitae

EDUCATION

Ph.D., School of Mechanical Engineering, Purdue University, West Lafayette, IN, May 2013
- Thesis Topic: *Print Mask Design for Inkjet Functional Printing*
- Advisor: Professor George T.-C. Chiu

M.S., Department of Mechanical Engineering, University of Kentucky, Lexington, KY, August 2007
- Area of Study: Systems and Design
- Advisor: Professor Johné M. Parker

B.S., Department of Mechanical Engineering, University of Kentucky, Lexington, KY, May 2006
- *Cum Laude,* With Honors in Engineering
- Double Major in Mathematics

ACADEMIC EXPERIENCE

Boston University, Department of Mechanical Engineering **– Assistant Professor** (July 2018 to Present)

Harvard University **- Postdoctoral Fellow** (August 2015 to July 2018)
- Supervisor: Professor Jennifer A. Lewis
- Developed high operating temperature direct ink writing (HOT-DIW) system with an unprecedented range of operating temperatures.
- Applied HOT-DIW to patterning mesoscale eutectic architectures for use as printed diffraction gratings.
- Developed and designed inks, processes, and architectures for applications in 3D printed stretchable electronics and soft robotics.

Purdue University (August 2007 to August 2015)
Postdoctoral Researcher (May 2013 to August 2015)
- Supervisors: Professors Rebecca K. Kramer and George T.-C. Chiu
- Developed materials and processes for inkjet printing stretchable electronics using mechanically sintered liquid metal nanoparticles.
- Developed an extrusion method for direct writing of functional materials.
- Designed and conducted experiments for flexible/stretchable device fabrication for soft robotics applications in the Purdue Faboratory.
- Collaborated with a consortium at Purdue University for the development of roll–to–roll functionalization systems.
- Developed technology for printing cells and pharmaceuticals.
- Assisted with grant proposals to national funding agencies.
- Mentored graduate and undergraduate students in the Purdue Faboratory and the Purdue Mechatronics Research Laboratory. Specifically, trained students on equipment, helped design experiments, and provided guidance to advance functional printing projects.

Summer Undergraduate Research Fellowship Mentor (2011; 2014**)**
- Supervisors: Professors Rebecca K. Kramer and George T.-C. Chiu

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- Assigned research projects and provided direction and consultation for an undergraduate student. Specifically, guided undergraduates with design and execution of printing experiments for characterization and with the development of a functional printing software.

Graduate Research Assistant (August 2007 to May 2013)

- Supervisor: Professor George T.-C. Chiu
- Conducted research in inkjet technology with applications in printed devices such as biosensors, mass sensors, and electrical devices.
- Experimentally characterized drop placement and drop volume variation, and the effects of material interaction and process parameters on functional performance.
- Physically modeled coalescence and ink migration of functional ink droplets on a substrate.
- Developed algorithms to design print routines in multi–nozzle inkjet systems to increase throughput while maintaining part fidelity.

Graduate Research Assistant (May 2009 to August 2009)

- Supervisor: Professor Kinam Park
- Developed and implemented automation tool for nanoscale drug fabrication with drug delivery applications.

***Waseda University* - Visiting Researcher** (May 2010 to July 2010)

- Supervisor: Professor Hiroyuki Kawamoto
- Designedandconductedexperimentsinvolvingelectrohydrodynamicinkjettechnology.

TEACHING EXPERIENCE

Purdue University (August 2008 to May 2015)

Course Advisor, Engineering Projects in Community Service (EPICS) (August 2013 to May 2015)

- Co–advise the Water Resource Management (WRM) team for EPICS, a course devoted to giving real world human–centered design experience to all undergraduate students from any major.
- Provide guidance and consultation to the students for successful completion of real world community service projects.

Teaching Assistant, EPICS (2011; 2012; 2013)

- Held office hours, graded assignments, instructed lab, conducted skills sessions, and provided engineering consultation.
- Provided guidance and consultation to the students for successful completion of real world community service projects.

Teaching Assistant, Introduction to Mechanical Engineering Design (ME263) (January 2012 to May 2012)

- Instructed lab, graded assignments, and provided engineering design consultation.

Teaching Assistant, Systems and Measurement (ME365) (2008; 2009; 2010; 2011)

- Held office hours, graded assignments, instructed lab, conducted skills sessions, and provided engineering consultation.

Teaching Assistant, Machine Design I (ME352) (June 2009 to August 2009)

- Held office hours, graded projects and exams, and instructed lab.

University of Kentucky - **Teaching Assistant, Engineering Experimentation I (ME310)** (August 2006 to May 2007)

- Held office hours, graded homework and lab reports, and instructed lab.

INDUSTRY EXPERIENCE

***Trane*® - Design Engineer** (January 2004 to August 2007)

- Developed and implemented automated CAD software (from customer to CAD assembly of customized air handler system).
- Assisted in a six sigma quality control project.
- Contributed to various air handler design projects.

PUBLICATIONS

Peer Reviewed Journal Articles

1. **J. William Boley*,** Wim M. van Rees*, C. Lissandrello, Ryan L. Truby, Jennifer A. Lewis, L. Mahadevan, “Shape-shifting lattices via multi-material 4D printing,” *In Preparation*. *Contributed Equally.
2. Shanliangzi Liu, Michelle C. Yuen, Edward L. White, **J. William Boley**, Biwei Deng, Gary J. Cheng, Rebecca Kramer-Bottiglio, “Laser Sintering of Liquid Metal Nanoparticles for Scalable Manufacturing of Soft and Flexible Electronics,” *ACS Applied Materials & Interfaces*. Vol. 10, Iss. 33, pp. 28232-28241, Jul 2018.
3. Arda Kotikian, Ryan L. Truby, **J. William Boley**, Jennifer A. Lewis, “3DPrinting of Liquid Crystal Elastomeric Actuators with Spatially Programmed Nematic Order,” *Advanced Materials*. Vol. 30, Iss. 10, 1706164, Mar 2018 (Front Cover).
4. Alexander D. Valentine, Travis A. Busbee, **J. William Boley**, Jordan R. Raney, Alex Chortos, Arda Kotikian, John D. Berrigan, Michael F. Durstock, Jennifer A. Lewis, “Hybrid 3D Printing of Soft Electronics,” *Advanced Materials*. Vol. 29, Iss. 40, 1703817, Sept 2017.
5. Trevor R. Lear, Seok-Hee Hyun, **J. William Boley**, Edward L. White, David H. Thompson, Rebecca K. Kramer, “Liquid metal particle popping: Macroscale to nanoscale,” *Extreme Mechanics Letters*. Vol. 13, pp. 126-134, May 2017.
6. **J. William Boley**, Kundan Chaudhary, Thomas J. Ober, Mohammadreza Khorasaninejad, Wei Ting Chen, Erik Hanson, Ashish Kulkarni, Jaewon Oh, Jinwoo Kim, Larry K. Aagesen, Alexander Y. Zhu, Federico Capasso, Katsuyo Thornton, Paul V. Braun, Jennifer A. Lewis, “High–Operating Temperature Direct Ink Writing of Mesoscale Eutectic Architectures,” *Advanced Materials*. Vol. 29, Iss. 7, 1604778, Feb 2017 (VIP Paper).
7. **J. William Boley**, Seok–Hee Hyun, Edward L. White, David H. Thompson, and Rebecca K. Kramer, “Hybrid Self–Assembly during Evaporation Enables Drop–on–Demand Thin Film Devices,” *ACS Applied Materials & Interfaces*. Vol. 8, Iss. 50, pp. 34171-34932, Dec 2016 (Front Cover).
8. Bumsoo Han, Gyu Young Yun, **J. William Boley**, Samuel Haidong Kim, Jun Young Hwang, George T.-C. Chiu, and Kinam Park, “Dropwise gelation–dehydration kinetics during drop–on–demand printing of hydrogel–based materials,” *International Journal of Heat and Mass Transfer*. Vol. 97, pp. 15-25, Jun 2016.
9. **J. William Boley**, Edward L. White, and Rebecca K. Kramer, “Mechanically Sintered Gallium–Indium Nanoparticles,” *Advanced Materials*. Vol. 27, Iss. 14, pp. 2355-2360, Feb 2015 (Inside Front Cover).
10. **J. William Boley**, Edward L. White, George T.-C. Chiu, and Rebecca K. Kramer, “Direct Writing of Gallium–Indium Alloy for Stretchable Electronics,” *Advanced Functional Materials*. Vol. 24, Iss. 23, pp. 3501-3507, Jun 2014 (Inside Front Cover).
11. Rebecca K. Kramer, **J. William Boley**, Howard A. Stone, James C. Weaver, and Robert J. Wood, “Effect of Microtextured Surface Topography on the Wetting Behavior of Eutectic Gallium-Indium Alloys,” *Langmuir*. Vol. 30, Iss. 2, pp. 533-539, Jan 2014.
12. Avijit Adak, **J. William Boley**, David Lyvers, George T.–C. Chiu, Phillip Low, Ronald G. Reifenberger, and Alexander Wei. “Label-Free Detection of *Staphylococcus aureus* Caputured on Immutable Ligand Arrays,” *ACS Applied Materials & Interfaces*. Vol. 5, Iss. 13, pp. 6404-6411, Jul 2013.
13. Vijay Kumar, Yushi Yang, **J. William Boley**, George T.-C. Chiu, and Jeffrey F. Rhoads, “Modeling, Analysis, and Experimental Validation of a Bifurcation-Based Microsensor,” *The Journal of Microelectromechanical Systems*. Vol. 21, Iss. 3, pp. 549-558, Jun 2012.
14. V. Kumar, **J. W. Boley**, Y. Yang, H. Ekowaluyo, J. K. Miller, G. T.-C. Chiu, and J. F. Rhoads, “Bifurcation–based mass sensing using piezoelectrically–actuated microcantilevers,” *Applied Physics Letters*. Vol. 98, Iss. 15, pp. 153510-153512, April 2011.
15. T. Bhuvana, **W. Boley**, B. Radha, B. Hines, G. Chiu, D. Bergstrom, R. Reifenberger, T.S. Fisher, and G.U. Kulkarni, “Inkjet Printing of Palladium Alkanethiolates for Facile Fabrication of Metal Interconnects and SERS Substrates,” *Micro & Nano Letters*, Vol. 5, Iss. 5, pp. 296-299, October 2010.

Conference Proceedings

1. N. Bajaj, **J. W. Boley**, A. Fulton, and G. T.-C. Chiu, "Syringe Position Control for Back Pressure. Modulated Drop Volume in Functional Inkjet Printing," in the *Proceedings of the 2014 Dynamic Systems and Control Conference*, San Antonio, Texas, October 22-24, 2014.
2. A. Fulton, **J. W. Boley**, N. Bajaj, and G. T.-C. Chiu, "Drop Volume Modulation via Applied Backpressure in Inkjet Systems," in the *Proceedings of the DF/NIP30 the International Conference on Digital Printing Technologies*, Philadelphia, Pennsylvania, September 7-11, 2014.
3. **J. W. Boley**, C. Shou, P. McCarthy, T. Fisher, and G. T.-C. Chiu, "The Role of Coalescence in Inkjet Printing Functional Films: An Experimental Study," in the *Proceedings of the DF/NIP29 the International Conference on Digital Printing Technologies*, Seattle, Washington, September 29-October 3, 2013.
4. **J. W. Boley**, C. Shou, P. McCarthy, T. Fisher, and G. T.-C. Chiu, "Effect of Print Masks on the Functional Performance of Inkjet Printed Pd Hexadecanethiolate in Toluene," in the *Proceedings of the DF/NIP29 the International Conference on Digital Printing Technologies*, Seattle, Washington, September 29-October 3, 2013.
5. **J. W. Boley**, C. Shou, and G. T.-C. Chiu, "Performance of Print Masks Using Image Quality Measurements," in the *Proceedings of the NIP28 the International Conference on Digital Printing Technologies*, Quebec City, Canada, September 9-13, 2012.
6. **J. W. Boley**, R. A. Sayer, and G. T.-C. Chiu, "Stochastic Modeling of Drop Coalescence on Non-Porous Substrates for Inkjet Applications," *Proceedings of the 2011 ASME Dynamic Systems and Control Conference*, Arlington, Virginia, October 31-November 2, 2011.
7. **J. W. Boley**, J. P. Allebach, and G. T.-C. Chiu, "Direct Binary Search for Print Mask Design," in the *Proceedings of the NIP27 the International Conference on Digital Printing Technologies*, Minneapolis, Minnesota, October 2-6, 2011.
8. **J. W. Boley**, K. Ariyur, G.T.-C. Chiu, "Coalescence Constraints for Inkjet Print Mask Optimization," *Proceedings of the 2010 IEEE/ASME International Conference on Advanced Intelligent Mechatronics*, pp. 1-6, Montreal, Canada, July 6-9, 2010.
9. **J. W. Boley**, and G. T.-C. Chiu, "Print Mask Design for Maximum Throughput Subject to Print Quality Constraints," in the *Proceedings of the NIP26 the International Conference on Digital Printing Technologies*, pp. 646-651, Austin, Texas, September 19-23, 2010 (Focal Paper).
10. V. Kumar, **J. W. Boley**, H. Ekowaluyo, J. K. Miller, G. C. Marvin, G. T.-C. Chiu, J. F. Rhoads, "Linear and nonlinear mass sensing using piezoelectrically-actuated microcantilevers," *Society for Experimental Mechanics-SEM Annual Conference and Exposition on Experimental and Applied Mechanics 2010*, pp. 571- 579, Indianapolis, Indiana, Canada, June 7-10, 2010.
11. **W. Boley**, T. Bhuvana, B. Hines, R.A. Sayer, G. Chiu, T.S. Fisher, D. Bergstrom, R. Reifenberger, and G.U. Kulkarni, "Inkjet Printing Involving Palladium Alkanethiolates and Carbon Nanotubes Functionalized with Single-Strand DNA," in the *Proceedings of the DF2009: Digital Fabrication Processes Conference*, pp. 824-827, Louisville, Kentucky, September 20-24, 2009 (Focal Paper).

Pending Patents

1. *"Methods of forming particulate films and films and devices made therefrom,"*, **J. William Boley**, Rebecca Kramer Bottiglio, Priority date: Feb 12, 2016, Filing date: Feb 10, 2017, Publication date: Aug 17, 2017, Application number: US 15/429,238.

Awarded Patents

1. *"Method of producing conductive patterns of nanoparticles and devices made thereof,"*, Rebecca Kramer Bottiglio, **J. William Boley**, Edward L. White, US 9,841,327 B2, issued 12/12/2017.

Dissertation

J. William Boley, "Print Mask Design for Inkjet Functional Printing," PhD thesis, Purdue University, May 2013.

PRESENTATIONS

"Directed Self-Assembly of Mesoscale Eutectic Architectures via High-Operating-Temperature Direct Ink Writing," MRS Fall Meeting, Boston, Massachusetts, November 30, 2017.

“Mechanics for Printed Liquid Metal Conformable Electronics,” Purdue School of Mechanical Engineering Seminar on Mechanics of Materials, West Lafayette, Indiana, December 2, 2014.

“Processing Liquid Metal for Conformable Electronics,” Society of Engineering Science 51st Annual Technical Meeting, West Lafayette, Indiana, October 2, 2014.

“Materials and Processes for Functional Printing,” 4th International Forum on Sustainable Manufacturing, Lexington, Kentucky, September 12, 2014 (Invited).

“Functional Printing: Integrating Material, Process, and Functionality,” National Academy of Engineering Regional Meeting, West Lafayette, Indiana, April 24, 2014.

“Effect of Print Masks on the Functional Performance of Inkjet Printed Palladium Hexadecanethiolate,” Society for Imaging Science and Technology, Seattle, Washington, October 3, 2013.

“Effect of Print Masks on the Functional Performance of Inkjet Printed Palladium Hexadecanethiolate,” Society for Imaging Science and Technology, Seattle, Washington, October 3, 2013.

“The Role of Coalescence in Inkjet Printing Functional Films: An Experimental Study,” Society for Imaging Science and Technology, Seattle, Washington, October 3, 2013.

“Performance of Print Masks Using Image Quality Measurements,” Society for Imaging Science and Technology, Quebec City, Canada, September 11, 2012.

“Inkjet Printing of Functional Devices,” Industrial Advisory Council, West Lafayette, Indiana, October 5, 2012.

“Stochastic Modeling of Drop Coalescence on Non-Porous Substrates for Inkjet Applications,” ASME Dynamic Systems and Control Conference, Arlington, Virginia, October 31, 2011.

“Inkjet Printing of Functional Devices,” Industrial Advisory Council, West Lafayette, Indiana, October 14, 2011.

“Direct Binary Search for Print Mask Design,” Society for Imaging Science and Technology, Minneapolis, Minnesota, October 5, 2011 (Focal).

“Print Mask Design for Maximum Throughput Subject to Print Quality Constraints,” Society for Imaging Science and Technology, Austin, Texas, September 23, 2010 (Focal).

“Inkjet Printing Involving Palladium Alkanethiolates and Carbon Nanotubes Functionalized with Single-Strand DNA,” Society for Imaging Science and Technology, Louisville, Kentucky, September 24, 2009 (Focal).

“Inkjet Printing of Palladium Hexadecylthiolate,” India-US Workshop, West Lafayette, Indiana, March 6, 2009.

“Inkjet-based Material Delivery and Fabrication,” Industrial Advisory Council, West Lafayette, Indiana, October 31, 2008.

REVIEWER
Langmuir
ACS Applied Materials and Interfaces
Advanced Materials
Advanced Functional Materials
International Mechanical Engineering Congress and Exposition (IMECE)

PROFESSIONAL ORGANIZATIONS
Materials Research Society (MRS), Member, 2016 - Present
Institute for Electrical and Electronic Engineers (IEEE), Member, 2010 - Present
Society for Imaging Science and Technology (IS&T), Member, 2009 - Present
American Society for Mechanical Engineers (AMSE), Member, 2005 - Present

COMMUNITY OUTREACH
Purdue University Course Advisor for Engineering Projects in Community Service (EPICS)
Elementary School Science Fair Judge
Middle School Teacher
Kindergarten Teacher
STEM Education Tutor

AWARDS
National Science Foundation (NSF) Travel Grant, 2014
Purdue University Donald English Endowment, 2012
Purdue University Adelberg Fellowship, 2007
University of Kentucky Harper Fellowship, 2006
Kentucky Educational Excellence Scholarship, 2001

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