Rachel C. Kurchin

Curriculum Vitae

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Scholar

EDUCATION

2019	**Massachusetts Institute of Technology** PhD in Materials Science and Engineering
2014	**University of Cambridge** MPhil in Materials Science and Metallurgy
2013	**Yale University** BS in Physics (Intensive) with distinction (magna cum laude, GPA 3.9)

RESEARCH POSITIONS

Starting Fall 2019	**Carnegie Mellon University, Department of Mechanical Engineering** Postdoctoral Researcher with Venkat Viswanathan
10/2014 – present	**MIT, Department of Mechanical Engineering** PhD Student with Tonio Buonassisi
Summers 2016, 2017	**National Renewable Energy Laboratory** Visiting Graduate Student with Vladan Stevanovi'c
10/2013 – 06/2014	**University of Cambridge, Department of Materials Science and Metallurgy** Master's student with Stoyan Smoukov
09/2012 – 05/2013	**Yale University, Department of Electrical Engineering** Undergraduate researcher with Minjoo Larry Lee
Summer 2012	**Colorado School of Mines, REMRSEC** REU student with Thomas Furtak
01/2012 – 05/2012	**Yale University, Department of Chemical Engineering** Undergraduate researcher with Chinedum Osuji
Summer 2011	**Weizmann Institute of Science, Department of Earth and Planetary Sciences** Undergraduate reseacher with Ilan Koren
Summer 2008	**University of Rochester, Laboratory for Laser Energetics** Undergraduate researcher with R. Stephen Craxton

TEACHING POSITIONS

01/2019 – 02/2019	**Harbour Research Program, China** Visiting Professor for "Academic Writing"
09/2018 – 12/2018	**MIT, Department of Materials Science and Engineering** Teaching Assistant for class 3.23: Electronic, Optical, and Magnetic Properties of Materials
2011 – 2013	**Yale University, Dean's Office** Science and QR Tutor

FELLOWSHIPS AND AWARDS

2018	**MIT Materials Day Best Poster Award** MIT Materials Research Laboratory
2017	**Blue Waters Graduate Fellowship** National Center for Supercomputing Applications

2016 **Total Energy Fellowship**
MIT Energy Initiative

2016 **Second Place, de Florez Award Competition**
MIT Mechanical Engineering Department

2014 **GRFP Honorable Mention**
National Science Foundation

2013 **Gates Cambridge Scholarship**
Cambridge Gates Trust

2013 **Howard L. Schultz Prize**
Yale Physics Department

2012 **Mellon Grant**
Pierson College at Yale University

2012 **REMRSEC REU Technical Achievement Award**
Colorado School of Mines Renewable Energy Materials Research Science and Engineering Center

2009 **Robert C. Byrd Honors Scholarship**
US Department of Education

2009 **Intel STS Semifinalist**
Intel Science Talent Search

PUBLICATIONS

2018 12. R. C. Kurchin, P. Gorai, T. Buonassisi, V. Stevanović. "Structural and Chemical Features Giving Rise to Defect Tolerance of Binary Semiconductors". Chemistry of Materials 30, 5583–5592 (2018)

11. J. Correa-Baena, L. Nienhaus, R. C. Kurchin, S. S. Shin, S. Wieghold, N. Hartono, M. Layurova, N. D. Klein, J. R. Poindexter, A. Polizzotti, S. Sun, M. G. Bawendi, T. Buonassisi. "A-site cation in inorganic $A_3Sb_2I_9$ perovskite influences structural dimensionality, exciton binding energy, and solar cell performance". Chemistry of Materials 30, 3734–3742 (2018)

2017 10. S. S. Shin, J. Correa-Baena, R. C. Kurchin, A. Polizzotti, J. J. Yoo, S. Wieghold, M. G. Bawendi, T. Buonassisi. "Solvent-Engineering Method to Deposit Compact Bismuth-Based Thin Films: Mechanism and Application to Photovoltaics". Chemistry of Materials 30, 336–343 (2017)

09. R. Brandt, R. C. Kurchin, V. Steinmann, D. Kitchaev, C. Roat, S. Levcenco, G. Ceder, T. Unold, T. Buonassisi. "Rapid semiconductor device characterization through Bayesian parameter estimation". Joule 1, 843–856 (2017)

08. R. Hoye, L. C. Lee, R. C. Kurchin, T. N. Huq, K. Zhang, M. Sponseller, L. Nienhaus, R. E. Brandt, J. Jean, J. A. Polizzotti, A. Kursumović, M. G. Bawendi, V. Bulović, V. Stevanović, T. Buonassisi, J. L. Macmanus-Driscoll. "Strongly Enhanced Photovoltaic Performance and Defect Physics of Air-Stable Bismuth Oxyiodide (BiOI)". Advanced Materials 29, (2017)

07. R. E. Brandt, J. Poindexter, P. Gorai, R. Kurchin, R. Hoye, L. Nienhaus, M. Wilson, J. A. Polizzotti, R. Sereika, Z. Raimundas, L. C. Lee, J. L. Macmanus-Driscoll, M. Bawendi, V. Stevanovic, T. Buonassisi. "Searching for "Defect-Tolerant" Photovoltaic Materials: Combined Theoretical and Experimental Screening". Chemistry of Materials 29, 4667–4674 (2017)

06. J. R. Poindexter, R. Hoye, L. Nienhaus, R. C. Kurchin, A. E. Morishige, E. E. Looney, A. Osherov, B. Lai, V. Bulovic, V. Stevanovic, M. G. Bawendi, T. Buonassisi. "High Tolerance to Iron Contamination in Lead Halide Perovskite Solar Cells". ACS Nano 11, 7101–7109 (2017)

2016 05. R. Hoye, P. Schulz, L. T. Schelhas, A. M. Holder, K. H. Stone, J. D. Perkins, D. Vigil-Fowler, S. Siol, D. O. Scanlon, A. Zakutayev, A. Walsh, I. C. Smith, B. C. Melot, R. C. Kurchin, Y. Wang, J. Shi, F. C. Marques, J. J. Berry, W. Tumas, S. Lany, V. Stevanović, M. F. Toney, T. Buonassisi. "Perovskite-inspired photovoltaics: Best practices in materials characterization and calculations". Chemistry of Materials 29, 1964–1988 (2016)

04. D. B. Needleman, J. R. Poindexter, R. .. Kurchin, I. M. Peters, G. Wilson, T. Buonassisi. "Economically sustainable scaling of photovoltaics to meet climate targets". Energy & Environmental Science 9, 2122–2129 (2016)

03. A. Gufan, Y. Lehahn, E. Fredj, C. Price, R. C. Kurchin, I. Koren. "Segmentation and Tracking of Marine Cellular Clouds observed by Geostationary Satellites". International Journal of Remote Sensing 37, 1055–1068 (2016)

2015 02. R. Hoye, R. E. Brandt, A. Osherov, V. Stevanović, S. D. Stranks, M. Wilson, H. Kim, A. J. Akey, R. C. Kurchin, J. R. Poindexter, E. N. Wang, M. G. Bawendi, V. Bulović, T. Buonassisi. "Methylammonium bismuth iodide as a lead-free, stable hybrid organic-inorganic solar absorber". Chemistry - A European Journal 22, 2605–2610 (2015)

01. R. E. Brandt, R. C. Kurchin, R. Hoye, J. R. Poindexter, M. Wilson, S. Sulekar, F. Lenahan, P. Yen, V. Stevanović, J. C. Nino, M. G. Bawendi, T. Buonassisi. "Investigation of Bismuth Triiodide (BiI_3) for Photovoltaic Applications". The Journal of Physical Chemistry Letters 6, 4297–4302 (2015)

TALKS

10/25/2018 *Semiconductor Parameter Extraction (and more!) with Bayesian Inference*
MIT Society of Industrial and Applied Mathematics, Cambridge, MA

08/27/2018 *Accelerated Discovery of Defect-Tolerant Photovoltaic Materials*
Viswanathan Group Meeting, Pittsburgh, PA

08/18/2018 *Computational Screening for Defect-Tolerant Semiconductors*
Gordon Research Seminar on Defects in Semiconductors, New London, NH

06/04/2018 *Structural and Chemical Features Contributing to Defect Tolerance of Binary Semiconductors*
Blue Waters Research Symposium, Sunriver, OR

11/28/2017 *Toward Quantitative Metrics to Screen for Defect Tolerance in Novel Semiconducting Materials*
Materials Research Society Fall Meeting and Exhibit, Boston, MA

04/29/2013 *Cross-Sectional EBIC Characterization of III-V Semiconductors for Photovoltaic Applications*
Yale Physics Department, New Haven, CT

04/27/2012 *Improving Active Layer Performance of Hybrid Photovoltaics by Nano Imprinting with Bulk Metallic Glass*
Yale Physics Department, New Haven, CT

POSTERS

10/18/2018 *Semiconductor Parameter Extraction via Current-Voltage Characterization and Bayesian Inference Methods*
MIT Materials Day, Cambridge, MA

08/18/2018 *Structural and Chemical Features Contributing to Defect Tolerance of Binary Semiconductors*
Gordon Research Seminar on Defects in Semiconductors, New London, NH

06/04/2018 *Structural and Chemical Features Contributing to Defect Tolerance of Binary Semiconductors*
Blue Waters Research Symposium, Sunriver, OR

06/14/2018 *Semiconductor Parameter Extraction via Current-Voltage Characterization and Bayesian Inference Methods*
World Conference on Photovoltaic Energy Conversion, Waikoloa, HI

05/11/2018 *Design Principles for Defect-Tolerant Photovoltaic Absorbers*
MIT de Florez Award Competition, Cambridge, MA

12/01/2016 *Quantitative Metrics for Defect Tolerance in Semiconductors*
Materials Research Society Fall Meeting and Exhibit, Boston, MA

10/14/2016 *Photovoltaics R&D: Thin Flm Materials*
MIT Energy Night, Cambridge, MA

05/05/2016 *Bayes-Sun Inference: Next-Generation Photovoltaics through Advanced Probabilistic Modeling*
MIT de Florez Award Competition, Cambridge, MA

04/12/2016 *Statistical Inference of Materials Properties from Solar Cell Measurements*
Beyond 2016: MIT's Frontiers of the Future symposium, Cambridge, MA

12/03/2015 *Improving the Accuracy of Novel Materials Screening: Growing Defect-Tolerant Photovoltaic Absorbers*
MRS Fall Meeting and Exhibit, Boston, MA

10/14/2015 *Toward Algorithmic Screening of Novel, Defect-Tolerant Solar Materials*
MIT Materials Day, Cambridge, MA

09/10/2015 *Solar Energy Technology & Innovation in Mexico*
MIT Energy Initiative Solar Day, Cambridge, MA

07/22/2015 *Toward Algorithmic Screening of Novel, Defect-Tolerant Solar Materials*
NREL HOPE workshop, Golden, CO

01/20/2013 *Raman Spectroscopy of Silicon Quntum Dots*
Northeast Conference for Undergraduate Women in Physics, Ithaca, NY

08/02/2012 *Raman Spectroscopy of Silicon Quntum Dots*
REMRSEC REU poster session, Golden, CO

SERVICE

2018 - present **Member, Graduate Student Advisory Group for Engineering**
MIT School of Engineering

2018 - present **Co-President, Women of Materials Science**
MIT Department of Materials Science

Spring 2017 **Graduate Student Mentor, Solar Spring Break**
MIT Energy Initiative

2016 - present **Student Representative, Energy Education Task Force**
MIT Energy Initiative

2015 **Conference Organizer**
Solar Energy Technology & Innovation in Mexico workshop

2015 - 2017 **Solar/Grid Community Co-Leader**
MIT Energy Club

January 2015 **Graduate Student Panelist**
Northeast Conference for Undergraduate Women in Physics

March 2014 **Science Demonstrator**
Cambridge Hands-On Science

2012 - 2013 **Project Bright Co-Leader**
Yale University

2012 **SPS Co-President**
Yale Society of Physics Students

2011 - 2012 **Conference Organizer**
Northeast Conference for Undergraduate Women in Physics

COMPUTER SKILLS

Simulation	VASP, SCAPS-1D, PC1D
Languages/Environments	Python (incl. numpy, scipy, pandas, matplotlib, Jupyter), MATLAB, LaTeX, Unix
HPC	Have earned allocations on and used both Intel and Cray systems including Peregrine (NREL), NERSC (LBL), Blue Waters (UIUC), Supercloud (MIT)
General	Hardware maintenance/repair

OTHER ACTIVITIES

Music - Violinist

2018 - present	MIT Musical Theatre Guild
2014 - 2017	MIT Gilbert &Sullivan Players
2014 - 2016	MIT Chamber Music Society
2009 - 2013	Jonathan Edwards College Philharmonic
2009 - 2013	Pit orchestras for the Yale Dramat, Yale Gilbert and Sullivan Society, Opera Theatre of Yale College, and various independent theatrical productions

Athletics

2018 - present	Treasurer, MIT Triathlon Team
2014, 2018	Finisher, Stockholm and Marine Corps Marathons
2013 - 2014	Rower, Churchill College Boat Club (1st women's VIII in May Bumps 2014)
2009 - 2012	Member (2009 – 2012), Manager (2010 – 2011), Yale Bulldog Cycling Team