Rachel C. Kurchin

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rkurchin.github.io

EDUCATION

2019 **Massachusetts Institute of Technology** *Cambridge, MA, USA*
Ph.D., Materials Science and Engineering, GPA 4.6/5.0

2014 **University of Cambridge** *Cambridgeshire, UK*
MPhil, Materials Science & Metallurgy (research-based)

2013 **Yale University** *New Haven, CT, USA*
B.S., Physics (Intensive), with distinction (magna cum laude, GPA 3.9/4.0)

RECENT RESEARCH POSITIONS

2019 – pres. **Carnegie Mellon University** *Mechanical Engineering, Materials Science and Engineering*
MFI ('19-'20), MolSSI ('21) Postdoctoral Fellow with Venkat Viswanathan and Jay Whitacre

2014 – 2019 **Massachusetts Institute of Technology** *Mechanical Engineering*
Ph.D. student with Tonio Buonassisi (committee: V. Stevanović, J. Grossman, B. Yildiz)

2016 – 2017 **National Renewable Energy Laboratory** *Solar Energy Research Facility*
Summer Visiting Graduate Student with Vladan Stevanović

RECENT FELLOWSHIPS AND AWARDS

2020 **MolSSI Software Fellowship** *Molecular Sciences Software Institute*

Rising Star in Computational and Data Sciences *Oden Institute at UT Austin*

2019 **MFI Postdoctoral Fellowship** *CMU Manufacturing Futures Initiative*

CCE Symposium Poster Prize *MIT Center for Computational Engineering*

2018 **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*

Second Place, de Florez Award Competition *MIT Dept. of Mechanical Engineering*

RECENT PUBLICATIONS (Google Scholar)

2020 [15] **R. Kurchin**, V. Viswanathan. "Marcus-Hush-Chidsey kinetics at electrode-electrolyte interfaces." *The Journal of Chemical Physics* 153, 134706 (2020)

[14] **R. C. Kurchin**, J. R. Poindexter, V. Vahanissi, et al."How much physics is in a current-voltage curve? Inferring defect properties from photovoltaic device measurements." *IEEE Journal of Photovoltaics* 10, 1532–1537 (2020)

2019 [13] **R. C. Kurchin**, G. Romano, T. Buonassisi. "Bayesim: a tool for adaptive grid model fitting with Bayesian inference." *Computer Physics Communications* 239, 161–165 (2019)

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**, et al. "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**, et al. "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, et al. "Rapid semiconductor device characterization through Bayesian parameter estimation." *Joule* 1, 843–856 (2017)

[08] R. Hoye, L. C. Lee, **R. C. Kurchin**, et al. "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**, et al. "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**, et al. "High tolerance to iron contamination in lead halide perovskite solar cells." *ACS Nano* 11, 7101–7109 (2017)

INVITED TALKS

2022 *Role of Defects in Photovoltaic Materials*
APS March Meeting, Chicago, IL

2021 *Accelerating Energy Materials Discovery with Computation*
Georgia Institute of Technology, Atlanta, GA (virtually)

Do Me a Solid: Materials Modeling to Fight Climate Change
Carnegie Mellon Department of Civil and Environmental Engineering, Pittsburgh, PA

2020 *High-fidelity Accelerated Design of High-performance Electrochemical Systems*
Materials Science & Technology Conference, online

Graph Convolutional Networks for Atomic Structures
Seminar Cambridge Machine Learning Discussion Group, Cambridge, UK

Marcus-Hush-Chidsey Kinetics at Solid Surfaces
Battery Modeling Webinar Series, online

Accelerating Energy Materials Discovery with Computation
Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), virtually in Nuremberg, Germany

Accelerating Energy Materials Discovery with Computation
Carnegie Mellon University Materials Science and Engineering Department, online

Accelerating Energy Materials Discovery with Computation
UIUC Electrical & Computer Engineering Department, Urbana, IL

2019 *Bayesim Workshop*
Helmholtz Institute for Renewable Energy, virtually in Nuremberg, Germany

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

CONTRIBUTED TALKS

2021 *Introducing Chemellia: Machine Learning, with Atoms*
JuliaCon, online

Building a Chemistry and Materials Science Ecosystem in Julia
JuliaCon, online

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

Structural and Chemical Features Contributing to Defect Tolerance of Binary Semiconductors
Blue Waters Research Symposium, Sunriver, OR

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

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

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

REVIEWING/EDITING

Editor

since 2021 **Journal of Open-Source Software** *Open Journals*

Reviewer

since 2021 **Chemistry of Materials** *Americal Chemical Society*
Journal of Physical Chemistry Letters *American Chemical Society*
PR Materials *Physical Review Journals*
JuliaCon
Computational Materials Science *Elsevier*
Journal of Photovoltaics *IEEE*
Nature Computational Science *Springer Nature*

since 2020 **NPJ Computational Materials** *Springer Nature*

2019 **NeurIPS ML4PS Workshop**

since 2019 **Applied Energy Materials** *American Chemical Society*

since 2017 **Energy & Environmental Science** *Royal Society of Chemistry*

OTHER SERVICE

July 2021 **Session Chair, Volunteer** *JuliaCon*

2021 – present **Grand Award Judge** *Regeneron ISEF*

2019 – 2020 **Conference Organizer** *Pittsburgh Conference for Undergraduate Women in Physics*

2018 – 2019 **Graduate Student Advisory Group for Engineering** *MIT School of Engineering*

2018 – 2019 **Co-President, Women of Materials Science** *MIT Department of Materials Science*

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

2016 – 2019 **Energy Education Task Force** *MIT Energy Initiative*

2016 – 2019 **Solar Test Bed Steering Committee** *MIT Office of Sustainability*

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*