Rishi E. Kumar
PhD Candidate
Materials Science and Engineering
University of California, San Diego

rishi42@gmail.com
(408) 234-9135
rekumar.github.io

BIOGRAPHICAL SKETCH

I believe that human-AI partnership and automation are epochal pillars for the science of tomorrow, and am seeking opportunities to work at the interface of robotics, machine learning, and materials informatics to accelerate material discovery. I have worked on a variety of materials projects across industrial and academic teams. From colloidal nanoparticle synthesis to solar cell design to synchrotron characterization, I strived to use software and hardware automation to expedite research tasks with high precision. Recently, I have designed and implemented an automated platform for high-throughput, closed-loop investigation of optoelectronic thin films.

Education & Training

University of California, San Diego	Materials Science & Engineering	Ph.D., 2017–present
University of California, San Diego	Nanoengineering	B.S., 2010–2014

Research & Professional Experience

2017 – present	Ph.D. Candidate, Fenning Lab
2015 – 2017	Research Associate II, nanoComposix
2014 – 2015	R&D Engineer, Kyocera North America
2013 – 2013	Fabrication Intern, Ultrasolar Technology
2013 – 2013	Undergraduate Researcher, Maple Lab (UCSD)

Publications

Peer Reviewed

11. Sarthak Jariwala, **Rishi E. Kumar**, Giles E. Eperon, Yangwei Shi, David P. Fenning, and David S. Ginger. Dimethylammonium addition to halide perovskite precursor increases vertical and lateral heterogeneity. *ACS Energy Letters*, 0(0):204–210, 2022.

10. **Rishi E. Kumar**, Armi Tiihonen, Shijing Sun, David P. Fenning, Zhe Liu, and Tonio Buonassisi. Opportunities for machine learning to accelerate halide perovskite commercialization and scale-up. *Matter*, accepted.

9. **Rishi E. Kumar**, Guillaume Von Gastrow, Nicholas Theut, April M. Jeffries, Tala Sidawi, Angel Ha, Flavia DePlachett, Hugo Moctezuma-Andraca, Seth Donaldson, Mariana I. Bertoni, and David P. Fenning. Glass vs. backsheet: Deconvoluting the role of moisture in power loss in silicon photovoltaics with correlated imaging during accelerated testing. *IEEE Journal of Photovoltaics*, page 1–8, 2021.

8. Arun Mannodi-Kanakkithodi, **Rishi E. Kumar**, DP Fenning, and MKY Chan. First principles modeling of polymer encapsulant degradation in Si photovoltaic modules. *Phys Chem Chem Phys*, 2021.

7. **Rishi E. Kumar**, Xueying L. Quinn, and David P. Fenning. Accounting for sample morphology in correlative x-ray microscopy via ray tracing. *MRS Advances*, 2021.

6. Taewoo Kim, **Rishi E. Kumar**, Jeffrey A. Brock, Eric E. Fullerton, and David P. Fenning. How strain alters CO_2 electroreduction on model Cu (001) surfaces. *ACS Catalysis*, page 6662–6671, 2021.

5. **Rishi E. Kumar**[†], Xueying L Quinn[†], Moses Kodur, Deniz N Cakan, Zhonghou Cai, Tao Zhou, Martin V Holt, and David P Fenning. Europium addition reduces local structural disorder and enhances photoluminescent yield in perovskite $CsPbBr_3$. *Adv. Optical Mater.*, page 2002221, 2021.

4. Susan A. Rigter, Xueying L. Quinn, **Rishi E. Kumar**, David P. Fenning, Philippe Massonnet, Shane R. Ellis, Ron M. A. Heeren, Katrine L. Svane, Aron Walsh, and Erik C. Garnett. Passivation properties and formation mechanism of amorphous halide perovskite thin films. *Advanced Functional Materials*, page 2010330, 2021.

3. Nengxu Li, Yanqi Luo, Zehua Chen, Xiuxiu Niu, Xiao Zhang, Jiuzhou Lu, **Rishi E. Kumar**, Junke Jiang, Huifen Liu, Xiao Guo, Barry Lai, Geert Brocks, Qi Chen, Shuxia Tao, David P. Fenning, and Huanping Zhou. Microscopic degradation in formamidinium-cesium lead iodide perovskite solar cells under operational stressors. *Joule*, 4(8):1743–1758, 2020.

2. Moses Kodur, **Rishi E. Kumar**, Yanqi Luo, Deniz N. Cakan, Xueying Li, Michael Stuckelberger, and David P. Fenning. X-ray microscopy of halide perovskites: Techniques, applications, and prospects. *Advanced Energy Materials*, 10(26):1–25, 2020.

1. **Rishi E. Kumar**, Guillaume Von Gastrow, Joswin Leslie, Rico Meier, Mariana I. Bertoni, and David P. Fenning. Quantitative determination of moisture content in solar modules by short-wave infrared reflectometry. *IEEE Journal of Photovoltaics*, 9(6):1748–1753, 2019.

In Progress

1. Arun Mannodi-Kanakkithodi, Nicholas Theut, **Rishi E. Kumar**, David P. Fenning, Mariana I. Bertoni, and Maria K. Y. Chan. Stability of interfacial structures in Si photovoltaic modules and the effect of moisture: Atomistic modeling of adhesion and experiments. *in preparation*.

Conference Talks

4. Active learning on computed property manifolds in high-throughput experiments. *Fall MRS*, 2021.

3. Deconvoluting the role of moisture in power loss in silicon photovoltaics with correlated imaging during accelerated testing. *IEEE PVSC*, 2021.

2. Morphology-informed correlation across multimodal microscopy data. *Spring MRS*, 2021.

1. Quantitative determination of moisture content in modules by short-wave infrared reflectometry. *IEEE PVSC*, 2019.

Patents

1. David P. Fenning, **Rishi E. Kumar**, and Guillaume Von Gastrow. Water reflection analysis of encapsulated photovoltaic modules, 2020.