Stanford

Kyle Frohna

Postdoctoral Scholar, Materials Science and Engineering

Publications

PUBLICATIONS

- **Multifunctional sulfonium-based treatment for perovskite solar cells with less than 1% efficiency loss over 4,500-h operational stability tests.** *Nature energy*
  Suo, J., Yang, B., Mosconi, E., Bogachuk, D., Doherty, T. A., Frohna, K., Kubicki, D. J., Fu, F., Kim, Y., Er-Raji, O., Zhang, T., Baldinelli, L., Wagner, et al
  2024; 9 (2): 172-183
- **Nanoscale chemical heterogeneity dominates the optoelectronic response of alloyed perovskite solar cells** *NATURE NANOTECHNOLOGY*
  Frohna, K., Anaya, M., Macpherson, S., Sung, J., Doherty, T. S., Chiang, Y., Winchester, A. J., Orr, K. P., Parker, J. E., Quinn, P. D., Dani, K. M., Rao, A., Stranks, et al
  2022; 17 (2): 190-196
- **Hybrid perovskites for device applications** *HANDBOOK OF ORGANIC MATERIALS FOR ELECTRONIC AND PHOTONIC DEVICES, 2ND EDITION*
  Frohna, K., Stranks, S. D., Ostroverkhova, O.
  2019: 211-256
- **Inversion symmetry and bulk Rashba effect in methylammonium lead iodide perovskite single crystals** *NATURE COMMUNICATIONS*
  Frohna, K., Deshpande, T., Harter, J., Peng, W., Barker, B. A., Neaton, J. B., Louie, S. G., Bakr, O. M., Hsieh, D., Bernardi, M.
  2018; 9: 1829
- **High carrier mobility along the [111] orientation in Cu2O photoelectrodes.** *Nature*
  Pan, L., Dai, L., Burton, O. J., Chen, L., Andrei, V., Zhang, Y., Ren, D., Cheng, J., Wu, L., Frohna, K., Abfalterer, A., Yang, T. C., Niu, et al
  2024; 628 (8009): 765-770
- **Multifunctional sulfonium-based treatment for perovskite solar cells with less than 1% efficiency loss over 4,500-h operational stability tests** *NATURE ENERGY*
  Suo, J., Yang, B., Mosconi, E., Bogachuk, D., Doherty, T. S., Frohna, K., Kubicki, D. J., Fu, F., Kim, Y., Er-Raji, O., Zhang, T., Baldinelli, L., Wagner, et al
  2024
- **Integration of Metal Meshes as Transparent Conducting Electrodes into Perovskite Solar Cells** *ADVANCED MATERIALS INTERFACES*
  Ongaro, C., Roose, B., Fleury, J., Schneider, R., Frohna, K., Ooi, Z., Heier, J., Stranks, S. D., Schuler, A.
  2023
- **Self-supervised deep learning for tracking degradation of perovskite light-emitting diodes with multispectral imaging** *NATURE MACHINE INTELLIGENCE*
  Ji, K., Lin, W., Sun, Y., Cui, L., Shamsi, J., Chiang, Y., Chen, J., Tennyson, E. M., Dai, L., Li, Q., Frohna, K., Anaya, M., Greenham, et al
  2023
- **Imaging Light-Induced Migration of Dislocations in Halide Perovskites with 3d Nanoscale Strain Mapping** *ADVANCED MATERIALS*
  Orr, K. P., Diao, J., Lintangpradipto, M., Batey, D. J., Iqbal, A. N., Kahmann, S., Frohna, K., Dubajic, M., Zelewski, S. J., Dearle, A. E., Selby, T. A., Li, P., Doherty, et al
  2023: e2305549
- **Methylammonium-free co-evaporated perovskite absorbers with high radiation and UV tolerance: an option for in-space manufacturing of space-PV?** *RSC ADVANCES*
  Lang, F., Chiang, Y., Frohna, K., Ozen, S., Neitzert, H. C., Denker, A., Stolterfoht, M., Stranks, S. D.
  2023; 13 (31): 21138-21145

- **Template Pore Size and A-Site Cation Management Dictate Luminescence Efficiency, Stability, and Wavelength in Confined Perovskite Nanostructures** *ADVANCED OPTICAL MATERIALS*
  da Costa, V. P., Frohna, K., Stranks, S. D., Coffer, J. L.
  2023; 11 (15)
- **Vacuum-Deposited Wide-Bandgap Perovskite for All-Perovskite Tandem Solar Cells** *ACS ENERGY LETTERS*
  Chiang, Y., Frohna, K., Salway, H., Abfalterer, A., Pan, L., Roose, B., Anaya, M., Stranks, S. D.
  2023; 8 (6): 2728-2737
- **The Electronic Disorde Landscape of Mixed Halide Perovskites** *ACS ENERGY LETTERS*
  Liu, Y., Banon, J., Frohna, K., Chiang, Y., Tumen-Ulzii, G., Stranks, S. D., Filoche, M., Friend, R. H.
  2023; 8 (1): 250-258
- **Taking a closer look - how the microstructure of Dion-Jacobson perovskites governs their photophysics** *JOURNAL OF MATERIALS CHEMISTRY C*
  Kahmann, S., Duim, H., Rommens, A. J., Frohna, K., ten Brink, G. H., Portale, G., Stranks, S. D., Loi, M. A.
  2022; 10 (46): 17539-17549
- **Local nanoscale phase impurities are degradation sites in halide perovskites** *NATURE*
  Macpherson, S., Doherty, T. S., Winchester, A. J., Kosar, S., Johnstone, D. N., Chiang, Y., Galkowski, K., Anaya, M., Frohna, K., Iqbal, A. N., Nagane, S., Roose, B., Andaji-Garmaroudi, et al
  2022; 607 (7918): 294-+
- **Extracting Decay-Rate Ratios From Photoluminescence Quantum Efficiency Measurements in Optoelectronic Semiconductors** *PHYSICAL REVIEW APPLIED*
  Bowman, A. R., Macpherson, S., Abfalterer, A., Frohna, K., Nagane, S., Stranks, S. D.
  2022; 17 (4)
- **Understanding Performance Limiting Interfacial Recombination in pin Perovskite Solar Cells** *ADVANCED ENERGY MATERIALS*
  Warby, J., Zu, F., Zeiske, S., Gutierrez-Partida, E., Frohloff, L., Kahmann, S., Frohna, K., Mosconi, E., Radicchi, E., Lang, F., Shah, S., Pena-Camargo, F., Hempel, et al
  2022; 12 (12)
- **Perovskite Solar Cells with Carbon-Based Electrodes - Quantification of Losses and Strategies to Overcome Them** *ADVANCED ENERGY MATERIALS*
  Bogachuk, D., Yang, B., Suo, J., Martineau, D., Verma, A., Narbey, S., Anaya, M., Frohna, K., Doherty, T., Mueller, D., Herterich, J. P., Zouhair, S., Hagfeldt, et al
  2022; 12 (10)
- **Overcoming Nanoscale Inhomogeneities in Thin-Film Perovskites via Exceptional Post-annealing Grain Growth for Enhanced Photodetection** *NANO LETTERS*
  Du, T., Richheimer, F., Frohna, K., Gasparini, N., Mohan, L., Min, G., Xu, W., Macdonald, T. J., Yuan, H., Ratnasingham, S. R., Haque, S., Castro, F. A., Durrant, et al
  2022; 22 (3): 979-988
- **Stabilized tilted-octahedra halide perovskites inhibit local formation of performance-limiting phases** *SCIENCE*
  Doherty, T. S., Nagane, S., Kubicki, D. J., Jung, Y., Johnstone, D. N., Iqbal, A. N., Guo, D., Frohna, K., Danaie, M., Tennyson, E. M., Macpherson, S., Abfalterer, A., Anaya, et al
  2021; 374 (6575): 1598-+
- **An open-access database and analysis tool for perovskite solar cells based on the FAIR data principles** *NATURE ENERGY*
  Jacobsson, T., Hultqvist, A., Garcia-Fernandez, A., Anand, A., Al-Ashouri, A., Hagfeldt, A., Crovetto, A., Abate, A., Ricciardulli, A., Vijayan, A., Kulkarni, A., Anderson, A. Y., Darwich, et al
  2022; 7 (1): 107-115
- **Manipulating Color Emission in 2D Hybrid Perovskites by Fine Tuning Halide Segregation: A Transparent Green Emitter** *ADVANCED MATERIALS*
  Zanetta, A., Andaji-Garmaroudi, Z., Pirota, V., Pica, G., Kosasih, F., Gouda, L., Frohna, K., Ducati, C., Doria, F., Stranks, S. D., Grancini, G.
  2022; 34 (1): e2105942
- **Proton-Radiation Tolerant All-Perovskite Multijunction Solar Cells** *ADVANCED ENERGY MATERIALS*
  Lang, F., Eperon, G. E., Frohna, K., Tennyson, E. M., Al-Ashouri, A., Kourkafas, G., Bundesmann, J., Denker, A., West, K. G., Hirst, L. C., Neitzert, H., Stranks, S. D.
  2021; 11 (41)

- **Unraveling the varied nature and roles of defects in hybrid halide perovskites with time-resolved photoemission electron microscopy** *ENERGY & ENVIRONMENTAL SCIENCE*

  Kosar, S., Winchester, A. J., Doherty, T. S., Macpherson, S., Petoukhoff, C. E., Frohna, K., Anaya, M., Chan, N. S., Madeo, J., Man, M. L., Stranks, S. D., Dani, K. M.

  2021; 14 (12): 6320-6328

- **Multimodal Microscale Imaging of Textured Perovskite-Silicon Tandem Solar Cells.** *ACS energy letters*

  Tennyson, E. M., Frohna, K., Drake, W. K., Sahli, F., Chien-Jen Yang, T., Fu, F., Werner, J., Chosy, C., Bowman, A. R., Doherty, T. A., Jeangros, Q., Ballif, C., Stranks, et al

  2021; 6 (6): 2293-2304

- **Revealing Nanomechanical Domains and Their Transient Behavior in Mixed-Halide Perovskite Films** *ADVANCED FUNCTIONAL MATERIALS*

  Mela, I., Poudel, C., Anaya, M., Delport, G., Frohna, K., Macpherson, S., Doherty, T. S., Scheeder, A., Stranks, S. D., Kaminski, C. F.

  2021; 31 (23)

- **Relaxed Current Matching Requirements in Highly Luminescent Perovskite Tandem Solar Cells and Their Fundamental Efficiency Limits** *ACS ENERGY LETTERS*

  Bowman, A. R., Lang, F., Chiang, Y., Jimenez-Solano, A., Frohna, K., Eperon, G. E., Ruggeri, E., Abdi-Jalebi, M., Anaya, M., Lotsch, B., Stranks, S. D.

  2021; 6 (2): 612-620

- **Unraveling the antisolvent dripping delay effect on the Stranski-Krastanov growth of CH₃NH₃PbBr₃ thin films: a facile route for preparing a textured morphology with improved optoelectronic properties** *PHYSICAL CHEMISTRY CHEMICAL PHYSICS*

  Kumar, J., Kumar, R., Frohna, K., Moghe, D., Stranks, S. D., Bag, M.

  2020; 22 (45): 26592-26604

- **Impact of Mesoporous Silicon Template Pore Dimension and Surface Chemistry on Methylammonium Lead Trihalide Perovskite Photophysics** *ADVANCED MATERIALS INTERFACES*

  da Costa, V. P., Gonzalez-Rodriguez, R., Frohna, K., Delport, G., Stranks, S. D., Canham, L. T., Coffer, J. L.

  2020; 7 (21)

- **Stable Hexylphosphonate-Capped Blue-Emitting Quantum-Confined CsPbBr₃ Nanoplatelets** *ACS ENERGY LETTERS*

  Shamsi, J., Kubicki, D., Anaya, M., Liu, Y., Ji, K., Frohna, K., Grey, C. P., Friend, R. H., Stranks, S. D.

  2020; 5 (6): 1900-1907

- **Proton Radiation Hardness of Perovskite Tandem Photovoltaics** *JOULE*

  Lang, F., Jost, M., Frohna, K., Kohnen, E., Al-Ashouri, A., Bowman, A. R., Bertram, T., Morales-Vilches, A., Koushik, D., Tennyson, E. M., Galkowski, K., Landi, G., Creatore, et al

  2020; 4 (5): 1054-1069

- **Structural and spectroscopic studies of a nanostructured silicon-perovskite interface** *NANOSCALE*

  Gonzalez-Rodriguez, R., Costa, V. P., Delport, G., Frohna, K., Hoye, R. Z., Stranks, S. D., Coffer, J. L.

  2020; 12 (7): 4498-4505

- **Photodoping through local charge carrier accumulation in alloyed hybrid perovskites for highly efficient luminescence** *NATURE PHOTONICS*

  Feldmann, S., Macpherson, S., Senanayak, S. P., Abdi-Jalebi, M., Rivett, J. H., Nan, G., Tainter, G. D., Doherty, T. S., Frohna, K., Ringe, E., Friend, R. H., Sirringhaus, H., Saliba, et al

  2020; 14 (2): 123-+

- **Charge-Carrier Recombination in Halide Perovskites** *CHEMICAL REVIEWS*

  deQuilettes, D. W., Frohna, K., Emin, D., Kirchartz, T., Bulovic, V., Ginger, D. S., Stranks, S. D.

  2019; 119 (20): 11007-11019

- **A Highly Emissive Surface Layer in Mixed-Halide Multication Perovskites** *ADVANCED MATERIALS*

  Andaji-Garmaroudi, Z., Abdi-Jalebi, M., Guo, D., Macpherson, S., Sadhanala, A., Tennyson, E. M., Ruggeri, E., Anaya, M., Galkowski, K., Shivanna, R., Lohmann, K., Frohna, K., Mackowski, et al

  2019; 31 (42): e1902374

- **Influence of Grain Size on Phase Transitions in Halide Perovskite Films** *ADVANCED ENERGY MATERIALS*

  Stavrakas, C., Zelewski, S. J., Frohna, K., Booker, E. P., Galkowski, K., Ji, K., Ruggeri, E., Mackowski, S., Kudrawiec, R., Plochocka, P., Stranks, S. D.

  2019; 9 (35)

- **Minimizing Current and Voltage Losses to Reach 25% Efficient Monolithic Two-Termina Perovskite-Silicon Tandem Solar Cells** *ACS ENERGY LETTERS*
  Bush, K. A., Manzoor, S., Frohna, K., Yu, Z. J., Raiford, J. A., Palmstrom, A. F., Wang, H., Prasanna, R., Bent, S. F., Holman, Z. C., McGehee, M. D.
  2018; 3 (9): 2173–80
- **Compositional Engineering for Efficient Wide Band Gap Perovskites with Improved Stability to Photoinduced Phase Segregation** *ACS ENERGY LETTERS*
  Bush, K. A., Frohna, K., Prasanna, R., Beal, R. E., Leijtens, T., Swifter, S. A., McGehee, M. D.
  2018; 3 (2): 428–35
- **Optical and Compositional Engineering of Wide Band Gap Perovskites with Improved Stability to Photoinduced Phase Segregation for Efficient Monolithic Perovskite/Silicon Tandem Solar Cells**
  Bush, K. A., Palmstrom, A. F., Yu, Z. J., Frohna, K., Manzoor, S., Ali, A., Ali, W., Prasanna, R., Beal, R. E., Leijtens, T., Bent, S. F., Holman, Z., McGehee, et al
  IEEE.2018: 0189–91