Matthew Sykes

Postdoctoral Fellow

Nanophotonics and Biofunctional Structures Group

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Education

Ph. D. Materials Science and Engineering, University of Michigan
B. S. Materials Science and Engineering, University of Illinois Urbana-Champaign

Research interests

- Ultrafast spectroscopy of nanomaterials
- Exciton diffusion and energy transfer in devices
- Plasmonics for energy conversion

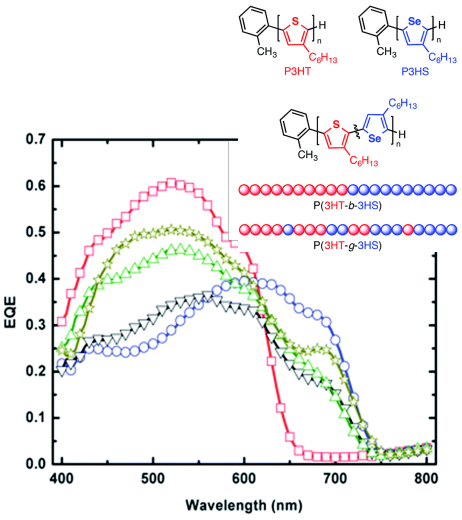
Professional Experience

Argonne National Laboratory - Center for Nanoscale Materials (CNM) *2015-present*
Postdoctoral Fellow

- Ultrafast spectroscopy of plasmonic metamaterials for applications in telecommunications, photodetection, and photocatalysis
- Energy relaxation in coupled light-matter systems

Selected Publications

Materials for solar energy conversion



1. J.A. Amonoo, A. Li, G.E. Purdum, **M.E. Sykes**, B. Huang, E.F. Palermo, A.J. McNeil, M. Shtein, Y.-L. Loo, and P.F. Green. An all-conjugated gradient copolymer approach for morphological control of polymer solar cells. *Journal of Materials Chemistry A* **3**, 20174 (2015).

2. S.E. Morris, D. Bilby, **M.E. Sykes**, H. Hashemi, M.J. Waters, J. Kieffer, J. Kim, and M. Shtein. Effect of axial halogen substitution on the performance of subphthalocyanine based organic photovoltaic cells. *Organic Electronics* **15**, 3660 (2014).

Exciton diffusion in organic photovoltaics

3. A. Barito, **M.E. Sykes**, B. Huang, D. Bilby, B. Frieberg, J. Kim, P.F. Green, and M. Shtein. Universal design principles for small molecular cascade heterojunction solar cells with high fill factor and internal quantum efficiency approaching 100%. *Advanced Energy Materials* **4**, 1400216 (2014).

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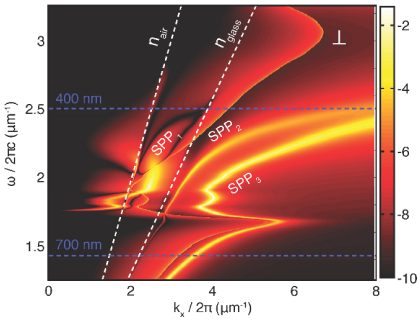
4. D. Bilby, J. Amonoo, **M.E. Sykes**, B. Frieberg, B. Huang, J. Hungerford, M. Shtein, P.F. Green, and J. Kim. Reduction of open circuit voltage loss in a polymer photovoltaic cell via interfacial molecular design: Insertion of a molecular spacer. *Applied Physics Letters* **103**, 203902 (2013).

5. A. Barito, **M.E. Sykes**, D. Bilby, J. Amonoo, Y. Jin, S.E. Morris, P.F. Green, J. Kim, and M. Shtein. Recovering lost excitons in organic photovoltaics with a transparent dissociation layer. *Journal of Applied Physics* **113**, 203110 (2013).

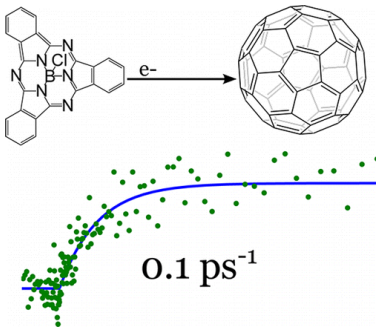
Nanocavity-coupled energy conversion devices



6. **M.E. Sykes**, A. Barito, J. Amonoo, P.F. Green, and M. Shtein. Broadband plasmonic photocurrent enhancement in planar organic photovoltaics embedded in a metallic nanocavity. *Advanced Energy Materials* **4**, 1301937 (2014).

7. K. Agrawal, **M.E. Sykes**, K.H. An, B. Freiberg, P.F. Green, and M. Shtein. Influence of exciton lifetime on charge carrier dynamics in an organic heterostructure. *Applied Physics Letters* **102**, 113304 (2013).

Ultrafast spectroscopy of semiconductor materials

8. D. E. Wilcox, M.H. Lee, **M.E. Sykes**, A. Niedringhaus, E. Geva, B.D. Dunietz, M. Shtein, and J.P. Ogilvie. Ultrafast charge-transfer dynamics at the boron subphthalocyanine chloride / C_{60} heterojunction: Comparison between experiment and theory. *Journal of Physical Chemistry Letters* **6**, 569 (2015).

9. D.E. Wilcox, **M.E. Sykes**, A. Niedringhaus, M. Shtein, J. P. Ogilvie. Heterodyne-detected and ultrafast time-resolved second-harmonic generation for sensitive measurements of charge transfer. *Optics Letters* **39**, 4274 (2014).