Moments in Materials Presentation:

Exciton Fission and Fusion

Speaker: Dan Congreve, Harvard Rowland Institute
When: Friday, June 30th 2017, 4:00 pm
Where: 209 Havemeyer Hall

Modern solar cells are hampered by two key losses: thermalization of high energy photons, and transmission of low energy photons. Exciton fission and fusion, respectively, have been put forward as potential solutions to these problems. In this talk, I will focus on recent efforts to implement these solutions in practical devices.

Fission devices have demonstrated quantum efficiencies greater than 100%, yet power efficiencies remain low, due to three key factors: low absorption, lack of low bandgap harvesting, and poor Voc conversion. The strongest solution to these problems may be the transfer of the energy into a colloidal nanocrystal which can then convert it into light. I will highlight the successes and challenges of this strategy.

For fusion, high quantum efficiency has not yet been demonstrated. Recent efforts have shown significant infrared harvesting utilizing colloidal nanocrystals, but solid state samples still have low absorption and efficiencies, limiting solar applications. I will discuss recent efforts to increase both factors in these systems, paving the way towards more efficient solar cells.

Congreve et al. Science 2013, 340 (61300), 334-337
Wu, Congreve et al. Nat. Photon. 2016, 10 (1), 31-34