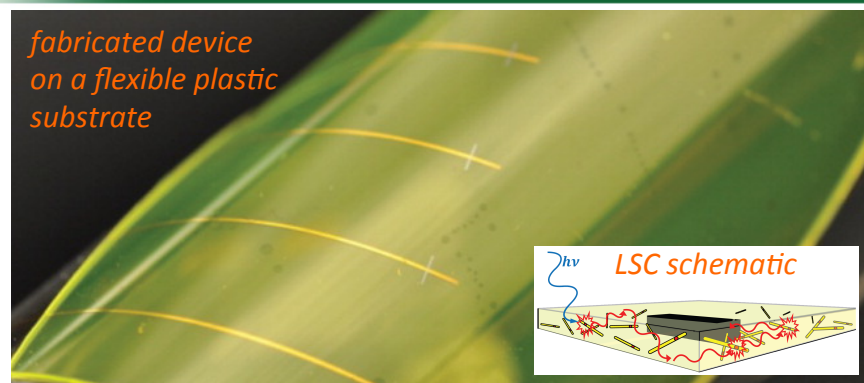
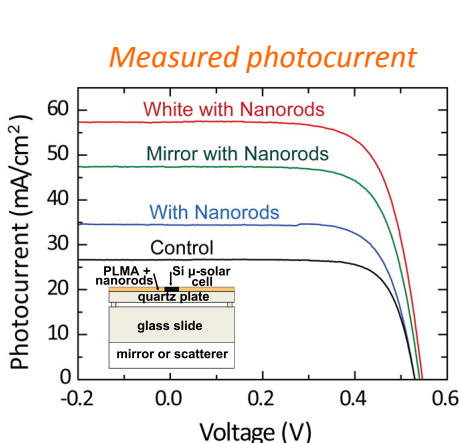
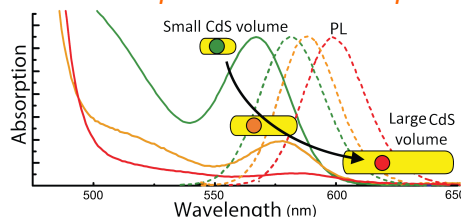
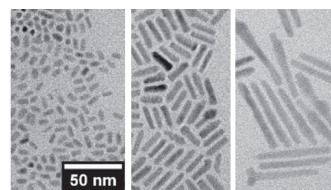


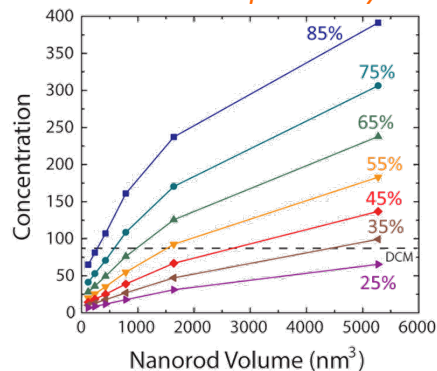
A Path to High-Concentration Luminescent Solar Concentrators with Nanorod Lumophores and Micro-Silicon Solar Cells



CdSe/CdS nanorods: TEM images and absorption & emission spectra



Predicted concentration for various nanorod quantum yields



Scientific Achievement

We fabricated and modeled luminescent solar concentrators (LSCs) incorporating micro-silicon solar cells and tunable CdSe/CdS nanorod lumophores, demonstrating a practical path to operation in the high-concentration regime.

Significance and Impact

LSCs enable non-tracking concentration of both direct sunlight and diffuse light onto high-efficiency solar cells, and our work predicts unprecedented levels of concentration in these devices.

Research Details

- Large CdSe/CdS nanorods reduce photon reabsorption in the LSC.
- An accurate Monte-Carlo ray-tracing model predicts a feasible path to high concentration of diffuse radiation.
- Calculations show that a simple Bragg mirror traps >99% of the luminesced light.
- High nanorod luminescence quantum yield, efficient luminescence trapping, and long propagation distances are all required in order to achieve high concentration.

N.D. Bronstein, L. Li, L. Xu, Y. Yao, V.E. Ferry, A.P. Alivisatos, R.G. Nuzzo, "Luminescent Solar Concentration Using Semiconductor Nanorods and Transfer-Printed Micro-Silicon Solar Cells." *ACS Nano* (2013) DOI: 10.1021/nn404418h