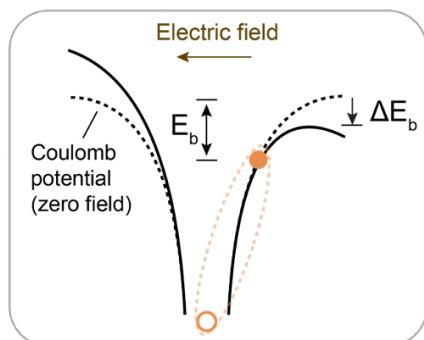


High-efficiency tandem organic photovoltaics

(a)



(b)

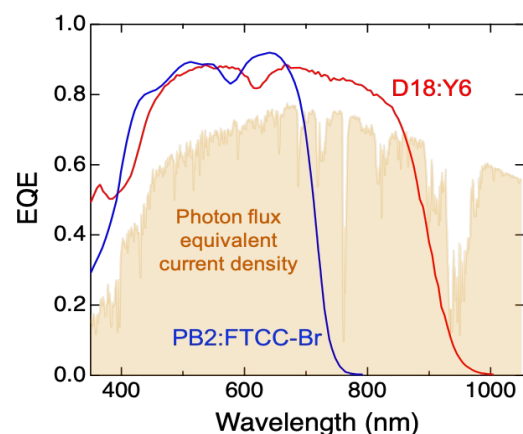


Figure: (a) We hope to engineer new materials that create an internal electric field that reduces charge transfer state binding energy (E_b). (b) External quantum efficiency of single junction narrow gap D18:Y6 and wide gap PB2:FTCC-Br cells. Combining these materials into a multijunction cell allows coverage of a wider spectrum than each cell alone.

Objective

➤ Break power conversion efficiency barriers in organic photovoltaic cells (OPVs) by utilizing high-efficiency materials in a tandem cell design

Impact

OPVs hold promise for applications such as semi-transparent power-generating windows and flexible electronics. While OPVs have demonstrated long operational lifetimes, their lower efficiencies remain a limitation. We propose to employ a four-terminal multijunction design, which offers the freedom to select the highest efficiency materials without the constraint of needing to match their current densities. We are also engineering new materials that facilitate charge transfer (CT) states with lower binding energies to increase open-circuit voltage, thereby enhancing overall efficiency.

Facilities and Methods Used

- Vacuum thermal evaporator
- Spin coater

Relevant Papers

- X. Che, et al., *Nature Energy*, DOI: 10.1038/s41560-018-0134-z

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Collaborators

- Prof. Chris Giebink
- Prof. Mark Thompson, University of Southern California

Contact

- Caroline Brustoloni (cbrustol@umich.edu)

Optoelectronic Components
and Materials Group **OCM**