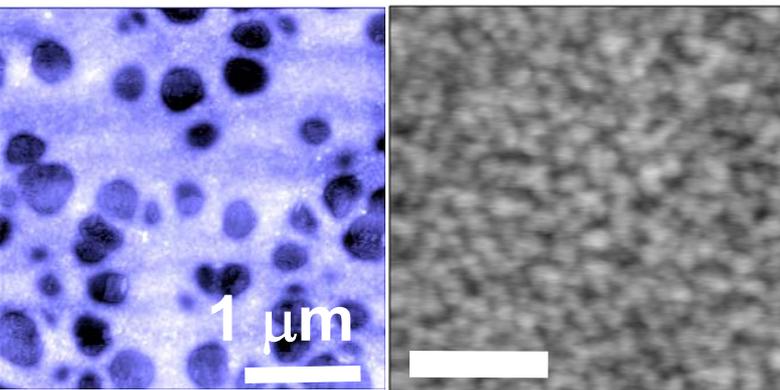


Understanding Organic PV Performance with Scanning Probe Microscopy

Film Morphology Critical to Performance

PFB/F8BT
(xylenes)

MDMO-PPV/PCBM
(chlorobenzene)



500 nm

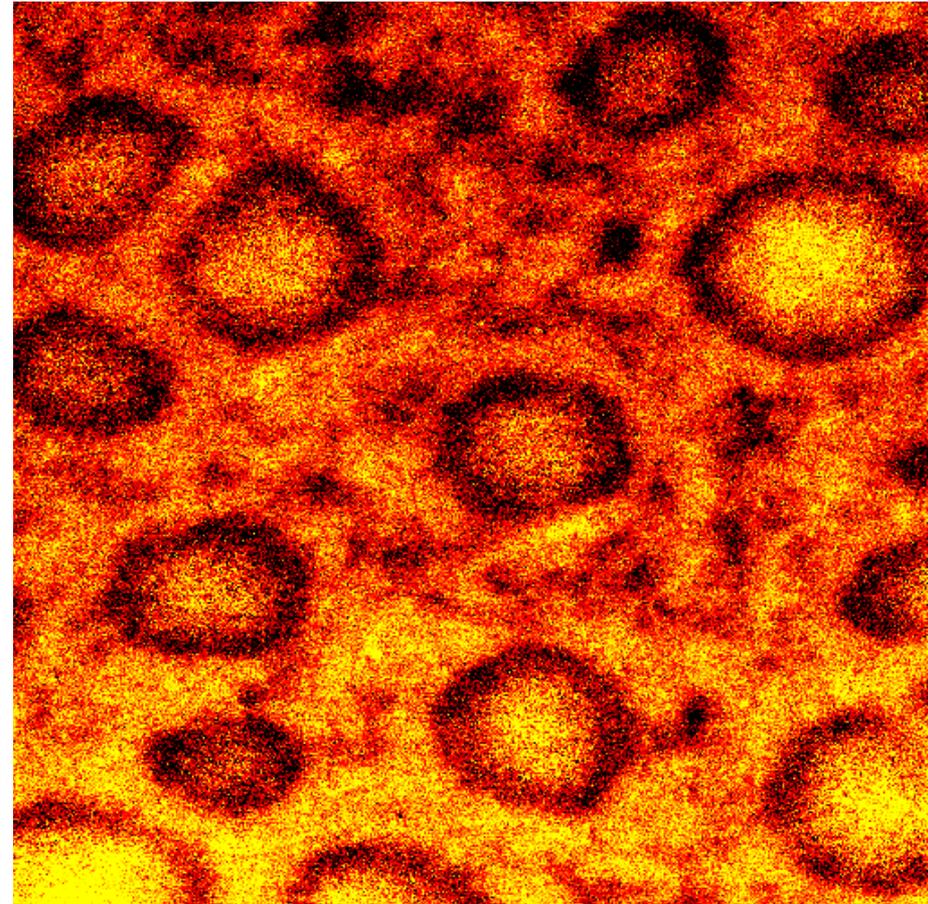
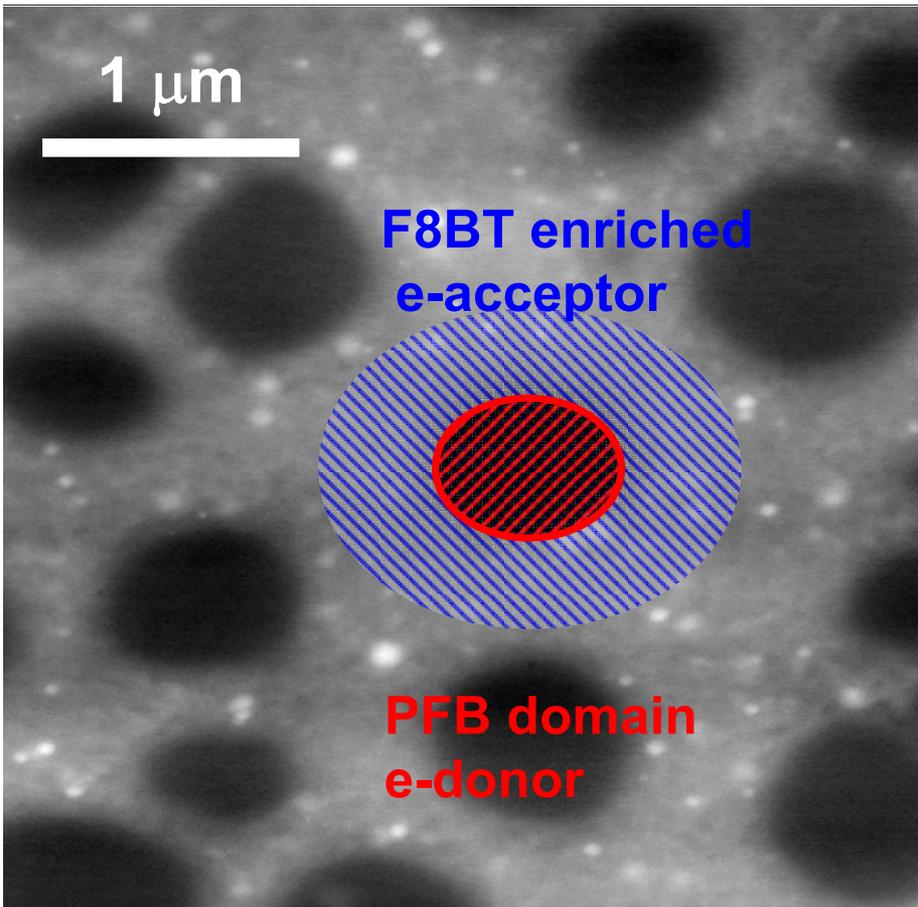
**Where are charges generated?
Where do charges recombine?
Where is current extracted?**

- D. S. Coffey and D. S. Ginger, *J. Am. Chem. Soc.* 127, 13, pp. 4564-4565 (2005)
J. H. Wei, D. C. Coffey, and D. S. Ginger, *J. Phys. Chem. B.* doi: 10.1021/jp065409a (2006)
D. C. Coffey, O. G. Reid, D. B. Rodovsky, G. T. Bartholomew, D. S. Ginger, *Nano Letters*, DOI: 10.1021/nl062989e (2007)
D. C. Coffey, D. S. Ginger, *Nature Materials* 5, 735 (2006)

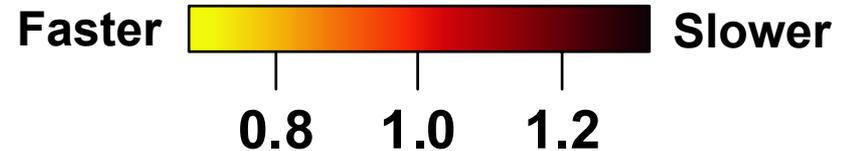
Mapping Carrier Generation

Height

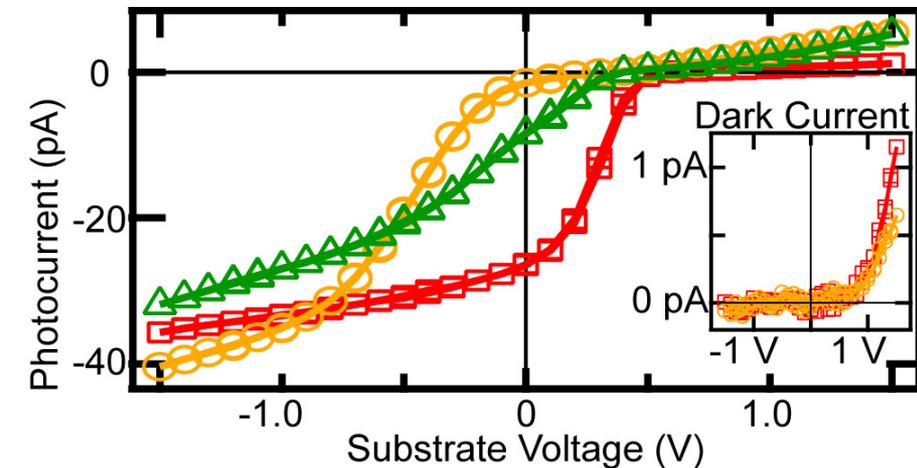
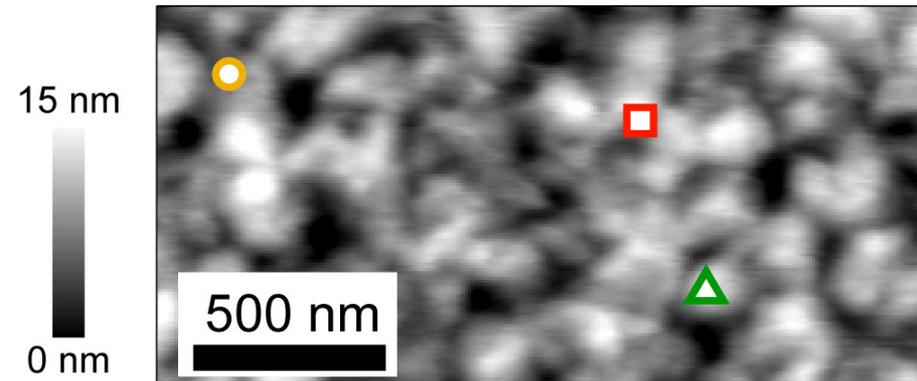
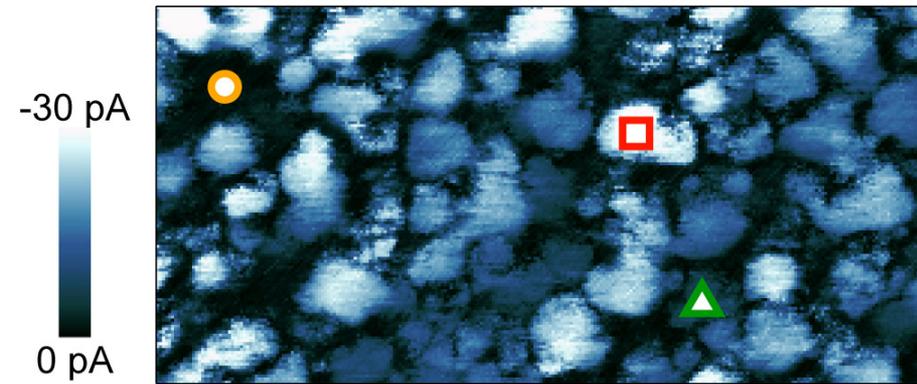
Charging Rate



(spin-coated from xylenes)



Local Photocurrent Variation



Height

EQE

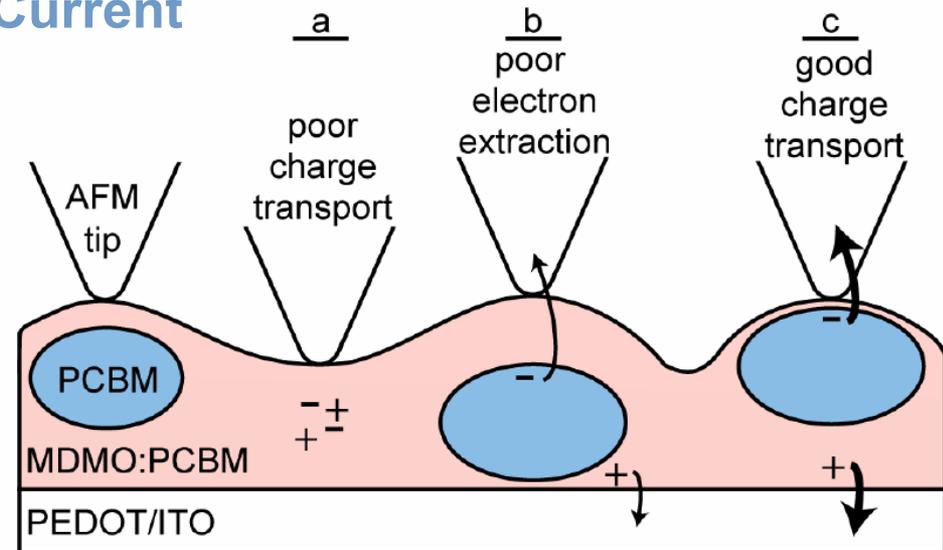
FF

OCV

all vary with location

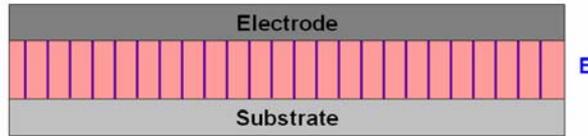
(spin-coated from xylenes)

Current



Local Mobility Variation

$$J = \frac{9}{8} \epsilon \epsilon_0 \mu_0 e^{-0.89\gamma\sqrt{V/L}} \frac{V^2}{L^3}$$



Device

- Deviation from plane-parallel geometry
- Tip-enhanced electric field
- Field and density dependent mobility

