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Plasmon Enhancement of Organic Solar Cells using Embossed Gratings DAVID SHOPE, Department of Chemistry and Physics, Trinity University, JENNIFER STEELE, Department of Physics and Astronomy, Trinity University — Organic photovoltaic cells (OPV) are attractive because of their low cost and easy fabrication. However, because the diffusion length of excitons in most organic photovoltaic material is about 100 nm, the overall thickness and therefore the optical absorbance of the device is limited, reducing the overall efficiency. Surface plasmon excitations have been studied as a possible mechanism to increase the absorption of light in solar cell active layers because of their ability to manipulate and enhance local electromagnetic fields. This work focuses on using metal gratings as one electrode. Gratings support a broad range of surface plasmons that can be tuned by changing the incident angle of light, making them ideal to isolate the contribution of surface plasmons to increases in the quantum efficiency of solar cells. OPV cells are made using a conjugated polymer and fullerene-based active layer with either an aluminum or silver bottom electrode patterned with a grating through microcontact printing. By measuring the efficiency of the solar cells as a function of both incident angle and wavelength, we can match increases in efficiency with specific surface plasmon modes.

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