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Plasmonic Enhancement of Organic Photovoltaic Devices HUY NGUYEN, RACHEL OWEN, MARTIN FERNANDEZ, BRAD JOHNSON, JANELLE LEGER, Department of Physics and Astronomy, Western Washington University — With the increasing demand for clean and renewable energy, organic photovoltaics (OPVs) provide a sustainable alternative to silicon based solar cells. While OPVs have the potential of being thinner and more affordable than their precursors, improving conversion efficiency of these devices has been challenging. One method that has been proposed for increasing device performance is the use of plasmonic waveguides as an electrical back contact to OPVs. Photons not absorbed by the active layer can excite charge density oscillations known as surface plasmon polaritons (SPPs) and provide an additional mechanism for energy conversion. However, overcoming propagation losses that occur at the metal-dielectric interface is a crucial step before significant improvements in OPV performance can be realized. Recently we have demonstrated a waveguide structure with a core dielectric layer of high refractive index capable of supporting guided wave plasmon polaritons modes (GW-PPMs). Unlike traditional SPPs, GW-PPMs have electric fields concentrated in the bulk dielectric leading to the potential for increased propagation lengths. Here we present our preliminary steps to GW-PPM waveguide and OPV integration with the goal of enhanced conversion efficiency.

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