Enhancement of OPV efficiency *via* surface plasmon resonance excitation in NIR region.

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Studies of organic photovoltaics (OPVs) have been in the field of interest of scientists for more than a decade. Although, the OPVs provide various advantages (i.e., lightweight, flexibility, and low-cost) that do not exist in conventional Si solar cells, the short diffusion range of carriers inside active layer is still the issue that limits the thickness of the active layer to be a few hundred nanometers. This cause low light absorption. We have studied plasmonic nanoobjects, including nanoparticles [1] and nanostructures [2-5] to provide additional enhancement on photocurrent (Jsc) and efficiency (η) which originated by the plasmonic excitation on the OPV devices. In this work, we demonstrate the utilization of plasmonic nanostructures to improve the efficiency of OPVs (PTB7:$PC_{71}BM$). Figure 1 shows a schematic of the fabricated OPV device. The additional light absorption induced by surface plasmon excitation in NIR region delivers the enhancement of J_{sc} and η for 22.6% and 32.2%, respectively. In addition, the matching of plasmonic excitation and absorption of active layers could be a key to achieve more plasmonic enhancement effect.

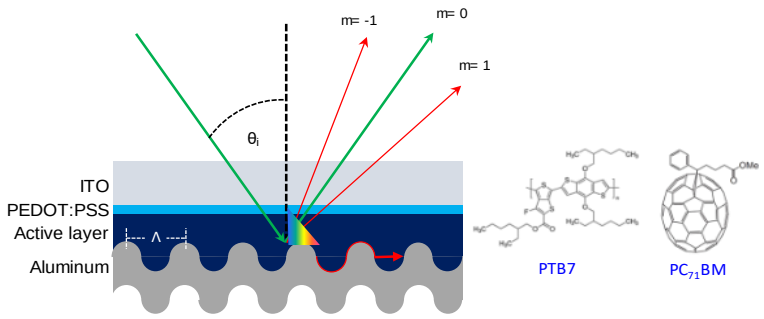

Figure 1 Schematic illustration of the fabricated OPV structure.

References

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