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Au Nanocluster assisted PCE improvement in PEDOT: PSS - Si Hybrid Devices MANISHA SHARMA, Department of Chemistry, University of Texas at San Antonio, One UTSA Circle, TX - 78254, PUSHPA RAJ PUDASAINI, ARTURO A. AYON, Department of Physics and Astronomy, University of Texas at San Antonio, One UTSA Circle, TX - 78249 — Poly(3,4-ethylenedioxythiophene):poly(styrene sulfonate) (PEDOT:PSS), a P-type organic polymer is frequently employed in the fabrication of heterojunction p-n solar cell devices due to its proper HOMO-LUMO band gap as well as its tunable conductivity. In this report we describe the incorporation of gold (Au) nanoclusters in the PEDOT:PSS blend and its influence on the power-conversion-efficiency (PCE) on planar silicon (Si) hybrid heterojunction solar cell devices. Specifically, the reference samples without the aforementioned nanoclusters, were measured to exhibit a 6.10% PCE, value that increased to 7.55% upon the addition of the Au nanoclusters. The observed increase in the PCE is attributed to the enhanced electrical conductivity of the PEDOT:PSS films due to the incorporation of the nanoclusters, which is directly reflected in their improved fill factor. It is further theorized that the presence of Au nanoclusters in the insulating PSS layer in the PEDOT:PSS blend have a positive influence in the charge collection effectiveness of the devices produced. Considering that the Au nanoparticles involved in this research exercise had an average size of only 4 nm, it is considered that plasmonic effects did not play a relevant role in the observed PCE improvement.

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