# Efficient Silicon/PEDOT:PSS Heterojunction Solar Cells

**Sasmita Nayak*, Sanjay K. Behura and Omkar Jani**

Gujarat Energy Research and Management Institute
1st Floor, Energy Building, PDPU Campus, Raisan Village, Gandhinagar - 382 007.
*Email: sasmitanayak@germi.res.in

Hybrid photovoltaic devices incorporating inorganic and organic materials are receiving great interest as an approach to next generation photovoltaics. These technologies are aimed at combining the advantages of different material systems to provide better efficiency, more cost efficient manufacturing, or both. Silicon/organic heterojunctions (SOH) are attractive because they can be fabricated at low temperatures, using simple methods such as spin coating. In comparison, conventional crystalline silicon solar cells require p-n junctions that are fabricated at temperatures higher than 800 ◦C. SOH based solar cells also do not require a plasma-enhanced chemical vapor deposition process to deposit amorphous silicon, as in the heterojunction with intrinsic thin-layer (HIT) technology. Due to the simplicity of fabrication and the potential for high efficiency, SOH solar cells may substantially reduce the cost of silicon photovoltaics. Poly(3,4-ethylenedioxythiophene) poly(styrenesulfonate) (PEDOT:PSS) is an organic polymer that is commonly used as a transparent conductor. The Si/PEDOT interface blocks electrons in *n*-type silicon from moving to the anode and functions as a low-temperature alternative to diffused *p-n* junctions. The device takes advantage of the light absorption and transport properties of silicon and combines it with the simplicity of fabrication afforded by organics.