Efficient polymer solar cells employing a non-conjugated small-molecule electrolyte

With the support by the National Natural Science Foundation of China, the research team led by Prof. Ge ZiYi (**葛子义**) at Ningbo Institute of Material Technology & Engineering, Chinese Academy of Sciences, creatively employed a non-conjugated small-molecule electrolyte as the cathode interface of polymer solar cells (PSC). A high power conversion efficiency (PCE) of 10.02% was achieved, which broken the threshold of 10% for single junction polymer solar cells. This result was published in *Nature Photonics* (2015, 9: 520—524).

PSC have attracted extensive attention due to the attraction of renewable energy sources that are potentially light-weight and low-cost. Generally, interfacial layers play very important roles, in which Ca and LiF have been widely used with vacuum deposition. Some solution processable conjugated polymers such as PFN have been demonstrated as promising interfacial layers, however, they are much expensive due to the complicated conjugated structures. Ge ZiYi's team first reported a water/alcohol soluble non-conjugated small-molecule electrolyte, MSAPBS without conjugated unites, which was used as a modifying layer for the cathode. The PCE of the device with the blend of $PC_{71}BM$/PTB7 as the active layer was significantly improved to 10.02%, ~20% higher than that of previous devices which used vacuum deposited Ca or LiF as cathode interface, and also better than those expensive conjugated interfacial materials. The efficiency was certified by the National Center of Supervision and Inspection on Solar Photovoltaic Products Quality of China (CPVT), and achieved high evaluation by the reviewers of *Nature Photonics* with the comment "The work is well presented and may provide a significant contribution to the field". This discovery opens a new avenue for polymer solar cells by fully exploiting the potential of various material systems with high efficiency.

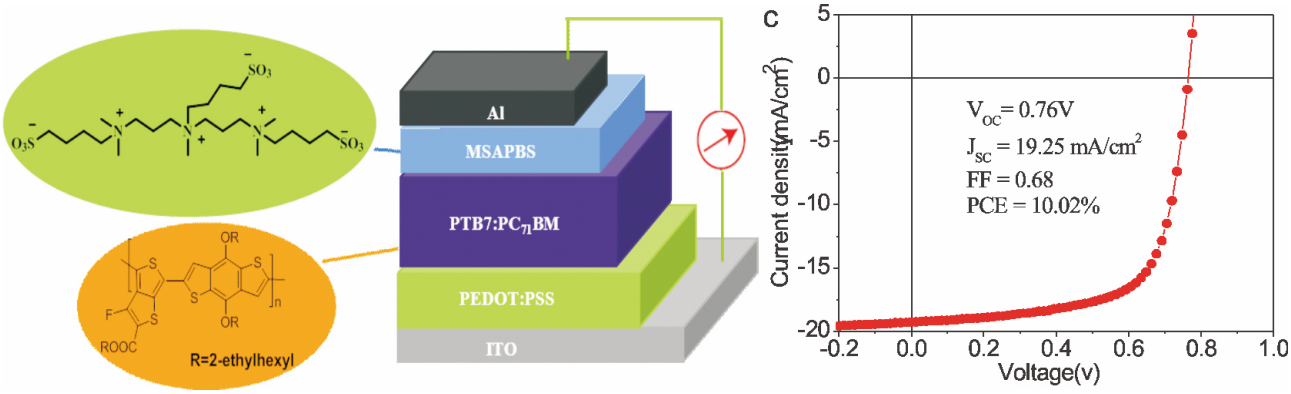

Figure Structure and current density versus voltage characteristics of PSC.