

European Chemistry Congress

June 16-18, 2016 Rome, Italy

Loss mechanism in the open circuit voltage of polymer solar cells

Zhicai He

South China University of Technology, P R China

Polymer solar cells (PSCs) have become a promising candidate for next-generation photovoltaics because the advantages of flexible, lightweight, large-area devices and room-temperature solution processible. Despite the power conversion efficiencies (PCE) of single junction PSCs has been improved to 10% recently, the open circuit voltage (V_{oc}) is still quite far away from the theoretic limit. Therefore it will open a new opportunities to further improve the PCE if the gap between the open circuit voltage and the bandgaps of the donor materials can be minimized. So the study on the formation and the loss mechanism of V_{oc} is in urgent need. In our recent work, the fundamental losses in V_{oc} of PSCs based on narrow bandgap polymers was found to can be effectively alleviated and be modulated over a wide range through the control over the band tailing below the LUMO of $PC_{71}BM$. By combining the analysis on the electrical, photocurrent spectral response characteristics of the working devices and the results from structure characterizations, the band tailing and the concomitant increase in the splitting of the electron and hole quasi-Fermi levels were found to be responsible for the V_{oc} . And a correlation between the band tailing and the photovoltage output of the device was established, thus can provide more insight into the origins and loss mechanism of the V_{oc} and guidelines for further improvement through either materials chemistry or device optimization.

Biography

Zhicai He has completed his PhD from South China University of Technology and became an Associate Professor in South China University of Technology in 2013. His research interest is recently centered on high performance organic solar cells. He has published more than 30 SCI papers in reputed journals and has 3000 citations.

zhicaihe@scut.edu.cn

Notes: