

MAR10-2009-020109

Abstract for an Invited Paper
for the MAR10 Meeting of
the American Physical Society

Very High Performance Polymer Solar Cells – A step closer to reality

YANG YANG, Department of Materials Science and Engineering, University of California, Los Angeles

Recently, together with our research partners, we have demonstrated polymer solar cell with a power conversion efficiency (PCE) of close to 8%. This is achieved by several technical and scientific approaches. A new series of photovoltaic polymers based on a low bandgap polymer, poly[4,8-bis-substituted-benzo [1,2-b:4,5-b'] dithiophene-2,6-diyl-alt-4-substituted-thieno[3,4-b]thio- phene-2,6-diyl] (PBDTTT), were designed and synthesized by chemists from University of Chicago and Solarmer Energy Inc., a start-up from UCLA. By adding different electron-withdrawing functional groups, the open circuit voltage (Voc) of polymers based on PBDTTT can be systematically increased, step by step. It was found that in this polymer system, the bandgap of the polymer can be maintained when the functional groups are added. As a result, the molecular energy levels of PBDTTT can be tuned without sacrificing the light harvesting. Together with the increased Voc, a polymer solar cell with efficiency as high as 7.7% PCE was realized, bringing them one step closer to reality for practical application.