

Efficient polymer light-emitting diodes and polymer solar cell with polyfluorene derivatives as an electron injecting layer and as a buffer layer

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Many types of conjugated polymers have been reported, in attempts to enhance efficiency for polymer solar cells (PSCs) and polymer light-emitting diodes (PLEDs). In particular, water-soluble conjugated polymers have also been extensively investigated due to multilayer formation capability. Recently, we synthesized a noble alcohol-soluble polyfluorene derivative (PF-GOH) containing four hydroxyl groups in each repeat unit in a multi-step procedure. The PF-GOH poly[9,9-bis(2-(2-(2-(2,3-dihydroxy)-methoxyethoxy)ethoxy)ethoxy)ethyl)-fluorene-2,4-diyl] was characterized by UV-visible and photoluminescence spectroscopy, gel permeation chromatography and cyclovoltametry, etc. It was able to apply in polymer solar cell and polymer light-emitting diode as buffer layer and electron injecting layer, respectively. To investigate the electron injection properties of PF-GOH, PLEDs with an ITO/PEDOT:PSS/MEH-PPV/PF-GOH/Al configuration were fabricated. Polymer solar cell were fabricated with ITO/PEDOT:PSS/P3HT:PCBM/PF-GOH/Al configuration. The experimental results will be presented in detail.