

C₇₀-based Water/Ethanol-Soluble Fullerene Acceptor for Solvent Composition-Tolerant
Performance of Eco-Friendly Polymer Solar Cells

김창균, 강현범, 최나연, 이승진, 김영권, 김진우, 우즈양¹, 우한영¹, 김범준[†]
한국과학기술원; ¹고려대학교
(bjkim02@kaist.ac.kr[†])

Eco-friendly polymer solar cells (eco-PSCs) based on aqueous-soluble conjugated materials have received great attention. In this work, the development of a C₇₀-based fullerene (PC₇₁BO₁₅) for eco-PSCs processed by water/ethanol is reported. The PCEs of fabricated eco-PSCs up to 2.51%, which is the highest value for aqueous-processed PSCs, was achieved thanks to the promising aggregation behavior and enhanced light absorption ability. The optimized PCE of the PC₇₁BO₁₅-based eco-PSCs is 73% higher than that of the PC₆₁BO₁₅-based. Also, the PC₇₁BO₁₅-based eco-PSCs show much greater tolerance in their PCEs to the water/ethanol composition. PC₇₁BO₁₅-based eco-PSCs at a 30:70 water/ethanol ratio maintain 89% of the optimal performance, whereas only 45% for PC₆₁BO₁₅-based devices. Different aggregation behaviors induced large difference in terms of water-tolerant behavior, which is explored by several characterizations. The PC₇₁BO₁₅-based eco-PSCs with aqueous processing can ensure excellent reproducibility.