High-efficiency organic-silicon heterojunction solarcells with high work function PEDOT:F-based hole-selective contacts†

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Abstract

Eficient and stable organic-silicon heterojunction solar cells are highly desirable. In this work, solution-processed poly(3,4-ethylenedioxythiophene): perfluorinated sulfonic acid (PEDOT: F) was investigated as a hole-selective contact for crystalline silicon (c-Si) solar cells. The optoelectronic properties, surface passivation and contact resistivity of PEDOT: F-based contacts on c-Si were investigated and optimized. The performance of the PEDOT:F-based hole-selective contact was verified on p-type c-Si solar cells. A record efficiency of 21.6% was achieved for an organic-silicon heterojunction solar cell featuring a full-area Al_2O_3/PEDOT: F/Ag rear contact for hole collection. The device displayed excellent environmental stability,

retaining 85% of its initial efficiency after exposure to air for 120 days

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