

Supplementary Information for

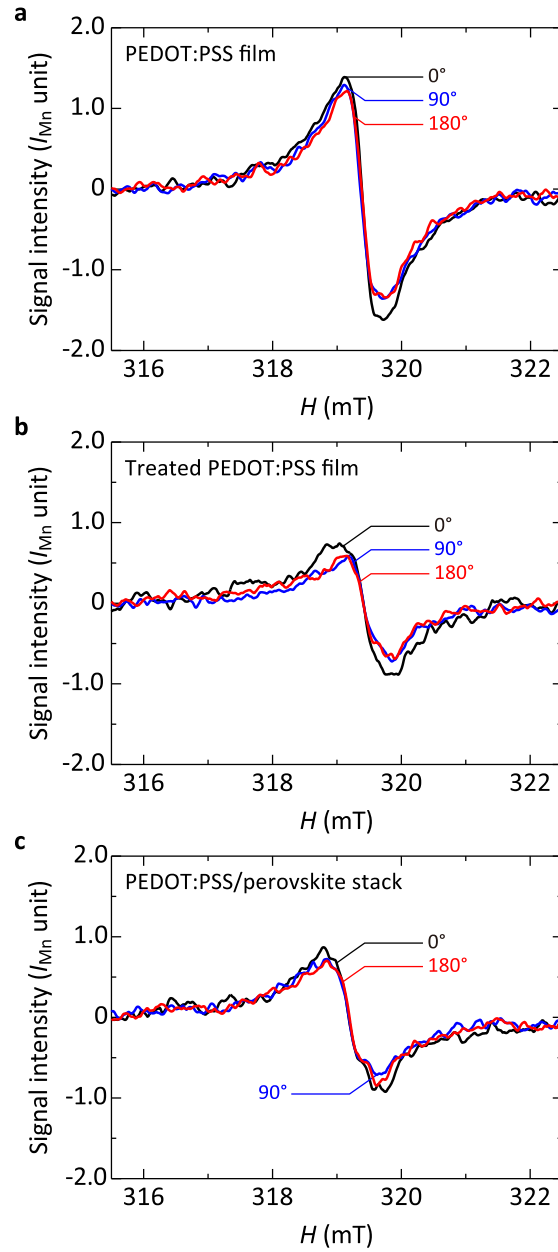
**Open-circuit-voltage improvement mechanism of perovskite
solar cells revealed by operando spin observation**

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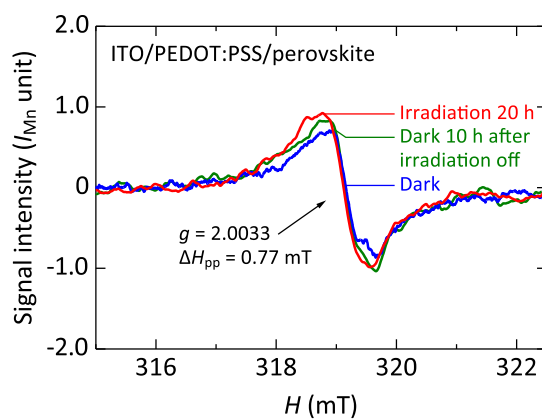
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S1. Isotropic g -factors of PEDOT:PSS films under dark conditions



Supplementary Figure 1 | Isotropic g -factors of PEDOT:PSS films. Angular dependence of ESR spectra of **a**, as-fabricated PEDOT:PSS film, **b**, treated PEDOT:PSS film, and **c**, PEDOT:PSS/perovskite stack. The angles indicated here are ones between the external magnetic field to the substrate plane.

S2. Light-irradiation effect for g -factor of an ITO/PEDOT:PSS/perovskite stack



Supplementary Figure 2 | ESR spectra of an ITO/PEDOT:PSS/perovskite stack.

The data were measured in the dark, under simulated solar irradiation for 20 h, and in the dark after 10 h of irradiation suspension.