Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supplementary information:

Built-in potential shift and Schottky-barrier narrowing in organic solar cells with UV-sensitive electron transport layers

Cheng Li, Dan Credgington, Doo-Hyun Ko, Zhuxia Rong, Jianpu Wang[1,a)] and Neil C. Greenham[a)]

Cavendish Laboratory, J J Thomson Avenue, Cambridge CB3 0HE, United Kingdom
1 Present address: Jiangsu-Singapore Joint Research Center for Organic/Bio- Electronics & Information Displays and Institute of Advanced Materials(IAM), Nanjing Tech University, Nanjing 211816, China.
a) Authors to whom correspondence should be addressed. Electronic addresses: iamjpwang@njtech.edu.cn or ncg11@cam.ac.uk.

Figure S1 presents the current density as a function of external DC voltage for an Al/TiO_x/ITO glass sandwich structure. Most devices of this type were found to be shorted, and the current densities are several orders of magnitude higher than those observed in solar cells. This is consistent with the Al penetrating the TiO_x during deposition, significantly reducing its effective thickness and likely doping the remaining oxide. Nevertheless, the presence of a largely symmetric tunnel barrier and a 10-fold increase in conductivity upon UV exposure is still observed.

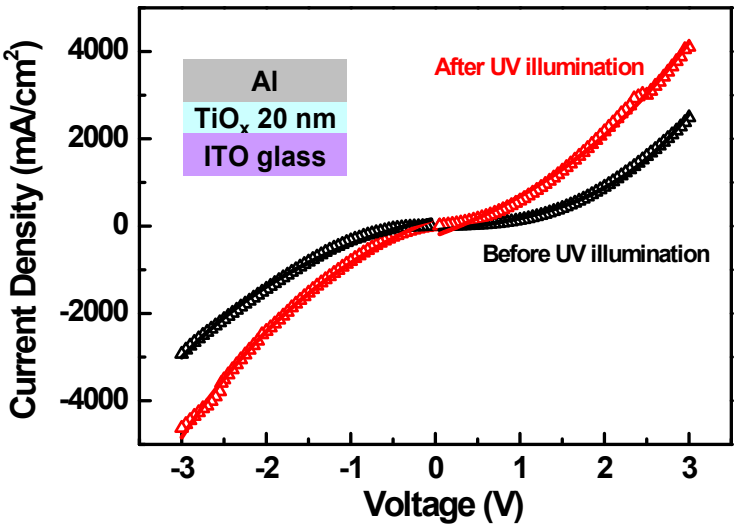

FIGURE S1: Current density-voltage measurement for Al/PCBM/TiO_x/ITO glass sandwich structure before and after 30 min UV illumination. Inset shows a schematic diagram of the structure, the solid lines are fitting lines by exponential functions.

Figure S2 represents the DC bias dependence of the EA signal at 2.0 eV, taken before UV illumination, immediately after UV illumination and after 12 h recovery without UV illumination. This result indicates that after 12 h recovery, the built-in potential returns to 0.5 V.

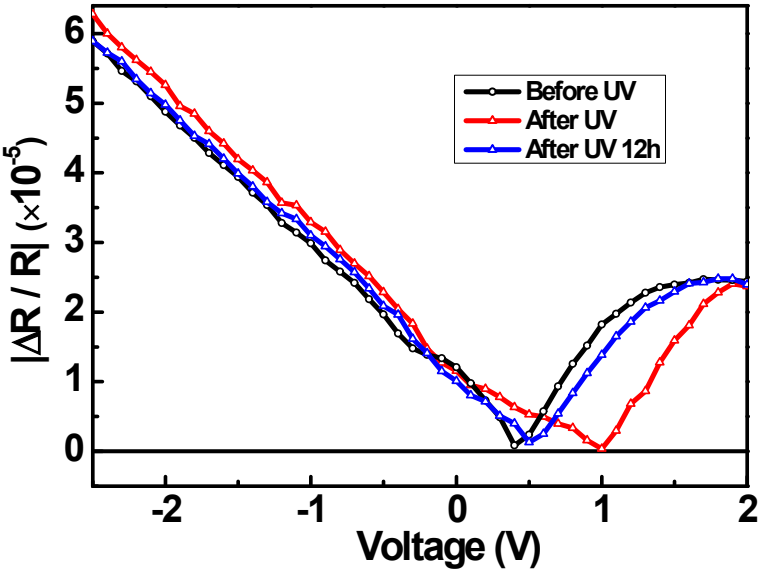

FIGURE S2: The DC bias dependence of the EA signal at 2.0 eV, taken before, after UV illumination and after UV 12 h.