Supporting Information

Preparation of Nanoscale Inorganic $CsPbI_xBr_{3-x}$ Perovskite Photosensitizers on the Surface of Mesoporous TiO_2 Film for Solid-State Sensitized Solar Cells

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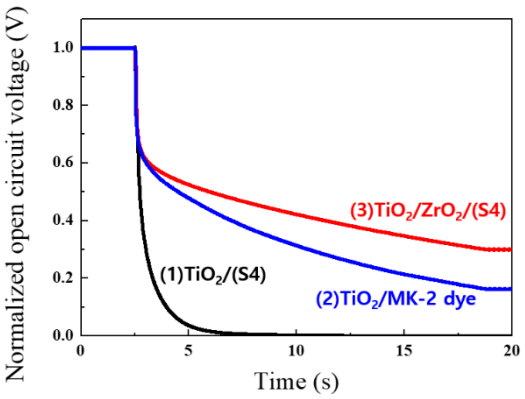

Figure S1. Comparison of normalized open-circuit voltage decay rate of (1) TiO_2/sample 4(S4), (2) TiO_2/organic dye (MK-2), and (3) TiO_2/ZrO_2/sample 4(S4) electrodes.

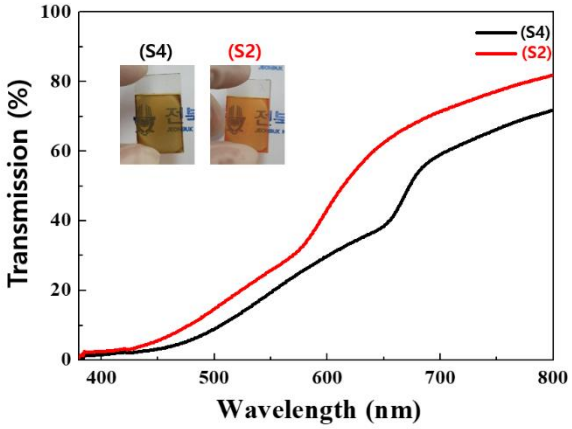

Figure S2. Transmission (%) curves of FTO/TiO_2/sample 4(S4) and FTO/TiO_2/sample 2(S2) with pictures of those electrodes in the inset.

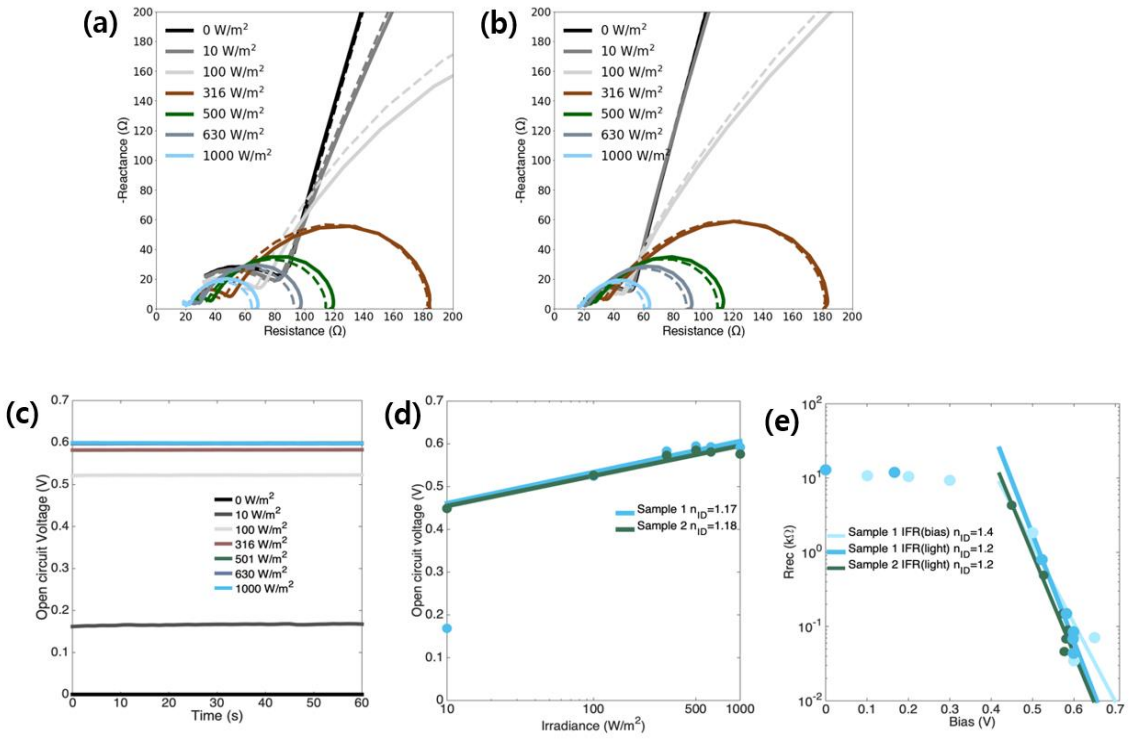

Figure S3. **(a-b)** Impedance Nyquist diagrams of two samples of $CsPbI_{2.2}Br_{0.8}$ analyzed by changing the light intensity. Solid lines are related to impedance scanned data from high to low frequencies (down), while marker points from low to high frequency (up). Corresponding (a) to sample 1 and (b) to sample 2. **(c)** V_{oc} recorded for 1 minute after the changes on the light intensity for sample 1, in order to determine the average value to be considered as bias in the IFR. **(d)** Estimated n_{ID} of both samples from the relationship between light intensity and V_{oc}, considering the V_{oc} as the average value during one minute before to perform the IFR at each light intensity, blue color for sample 1 and green color for sample 2. **(e)** n_{ID} was also estimated for sample 1 changing the bias in the IFR. Corresponding marker points to experimental data and solid lines to fit.

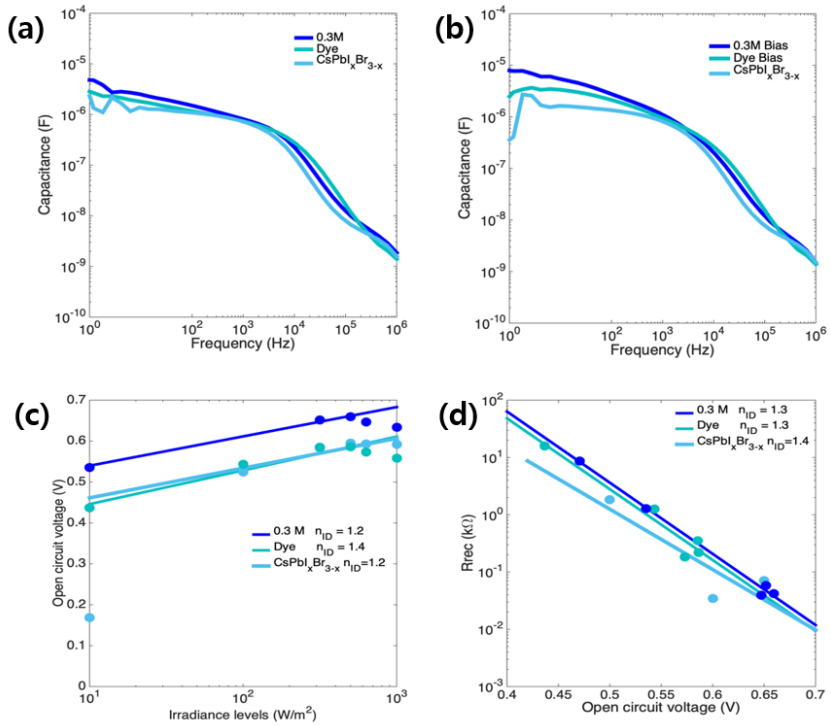

Figure S4. Comparing capacitance at **(a)** 0.2 and **(b)** 0.5 V of bias and fixing the light intensity at 100 W/m^2, among dye (MK-2)-, nanoscale $MAPbI_3$- and nanoscale $CsPbI_{2.2}Br_{0.8}$-sensitized cells. **(c)** Comparing ideality factor estimated from V_{oc} and light intensities among nanoscale $MAPbI_3$-, dye (MK-2)- and nanoscale $CsPbI_{2.2}Br_{0.8}$-sensitized cells. **(d)** Comparing ideality factor from impedance frequency response at different bias fixing the light intensity at 100 W/m^2 among nanoscale $MAPbI_3$-, dye (MK-2)- and nanoscale $CsPbI_{2.2}Br_{0.8}$-sensitized cells. (Data from nanoscale $MAPbI_3$- and dye (MK-2)-sensitized cells were adopted from our previous report [1] for comparison with nanoscale $CsPbI_{2.2}Br_{0.8}$-sensitized cell from current study)

[1] S.-M. Yoo, S.-Y. Lee, E. V. Hernandez, M. Kim, G. Kim, T. Shin, M. K. Nazeeruddin, I. Mora-Seró, H. J. Lee, Nanoscale Perovskite-Sensitized Solar Cell Revisited: Dye-Cell or Perovskite-Cell? ChemSusChem 13(2020) 2571-2576.