Electronic Supplementary Material (ESI) for Nanoscale Advances.

SUPPLEMENTARY INFORMATION

Enhanced Charge Separation in g-C_3N_4 – BiOI Heterostructures for Visible Light Driven Photoelectrochemical Water Splitting

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Applied bias photon-to-current efficiency (ABPE):

The ABPE% was calculated by using following folrmula:

ABPE (%) = [J (mA cm^{-2}) x (1.23–V_b)/ P (mW cm^{-2})] x 100 …… Eqn- (1)

Where, J is the current density, V_b is applied voltage at RHE scale and P is power density of the incident light.

The applied voltage on Ag/AgCl scale was converted RHE scale by using following expression.

$V_{RHE} = V_{Ag/AgCl} + 0.059\ pH + V^0_{Ag/AgCl}$ ……..…Eqn - (2)

Where; $V^0_{Ag/AgCl} = 0.197$ V.

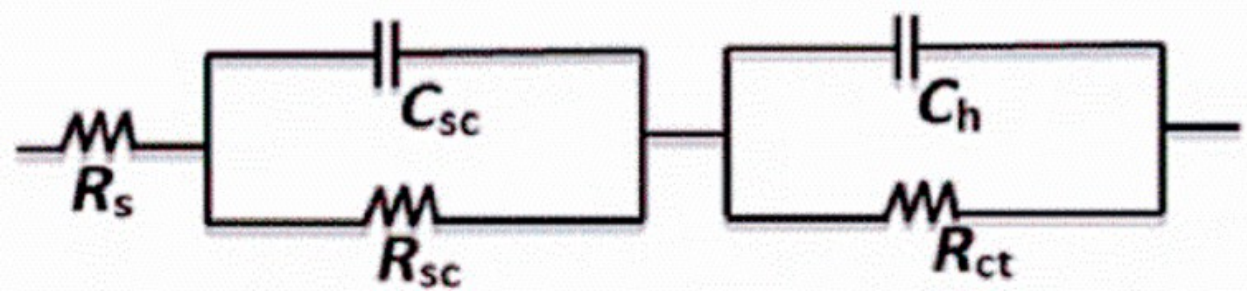

Figure S1. Equivalent circuit used to model the EIS Nyquist plots for g-C_3N_4-S, g-C_3N_4, BiOI, g-C_3N_4-S/BiOI, and g-C_3N_4/BiOI films. EIS data was obtained using AM1.5 G one sun illumination, in the frequency range of 0.1 to 10000 Hz, and at a potential of -0.2 V *vs* Ag/AgCl.

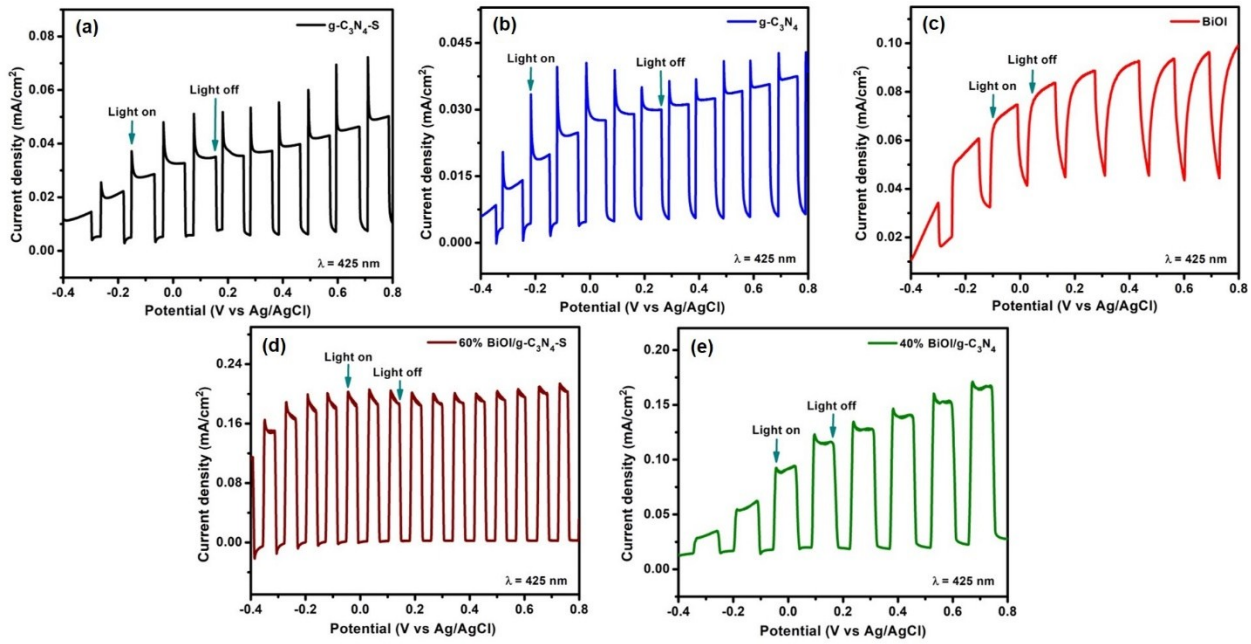

Figure S2. Photocurrent response under 425 nm LED light (54.15 W cm $^{-2}$) during on-off cycle for (a) g-C_3N_4-S (black), (b) g-C_3N_4(blue), (c) BiOI (red), (d) g-C_3N_4-S/BiOI (wine red) and (e) g-C_3N_4/BiOI (green)

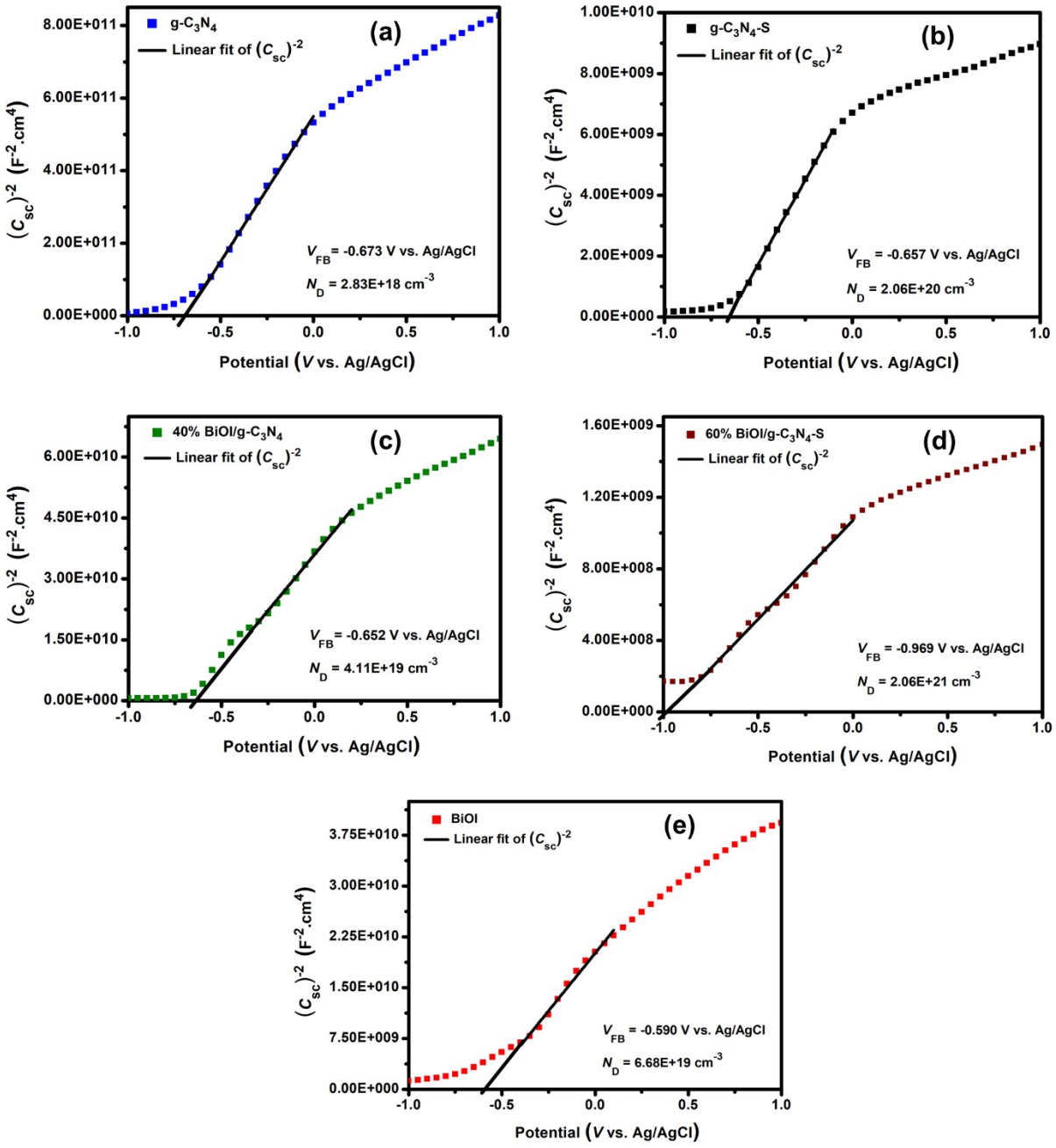

Figure S3. Mott-Schottky plots of bulk g-C_3N_4 (blue), g-C_3N_4-S (black), 40% BiOI/g-C_3N_4 (green), 60% BiOI/g-C_3N_4-S (wine red), and BiOI (red).

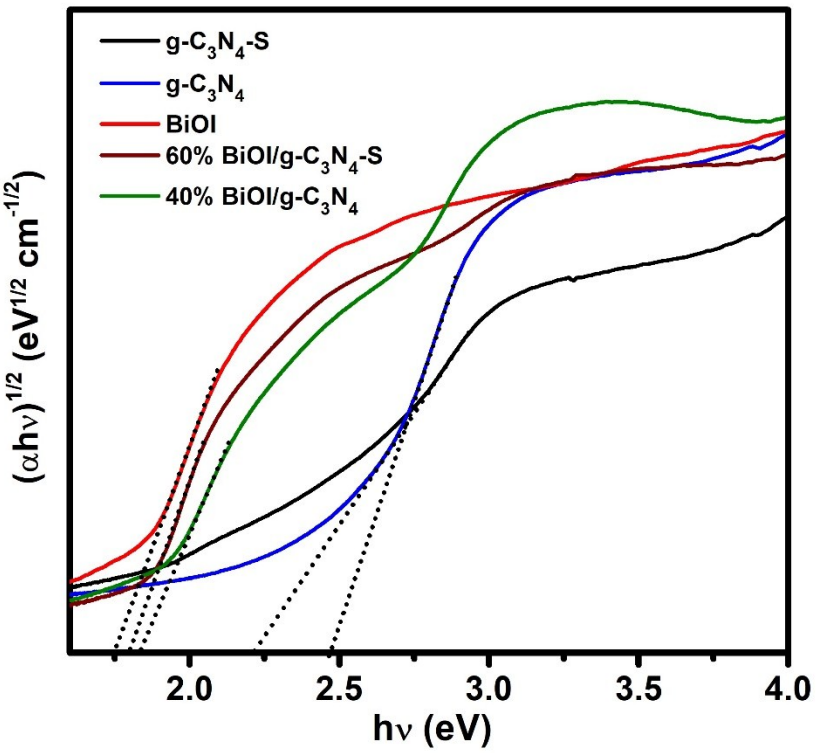

Figure S4. Tauc plots for the determination of the effective optical bandgaps of g-C_3N_4-S (black), bulk g-C_3N_4 (blue), BiOI (red), g-C_3N_4-S/BiOI (wine) and g-C_3N_4/BiOI (olive green).

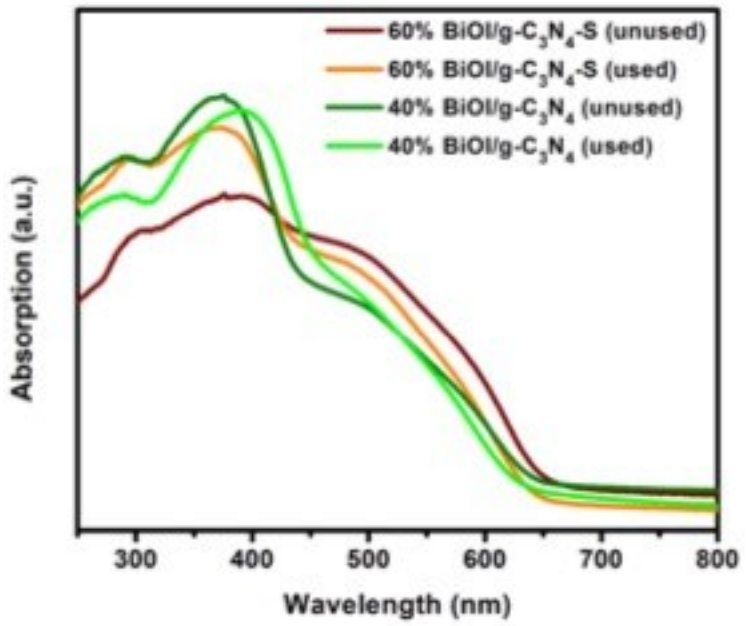

Figure S5. UV-Vis absorption spectra collected in diffuse reflectance mode (DR) mode for g-C_3N_4-S/BiOI and g-C_3N_4/BiOI heterostructures before (wine red and green) and after (orange and light green) several photoelectrochemical cycles respectively.

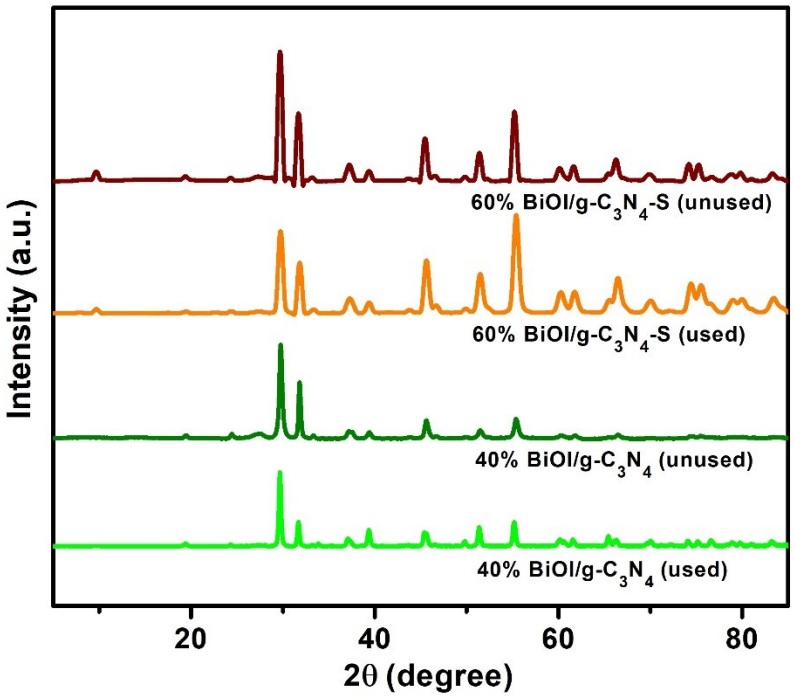

Figure S6. X-Ray diffractograms of g-C_3N_4-S/BiOI and g-C_3N_4/BiOI heterostructures before (wine red and green) and after (orange and light green) several photoelectrochemical cycles.

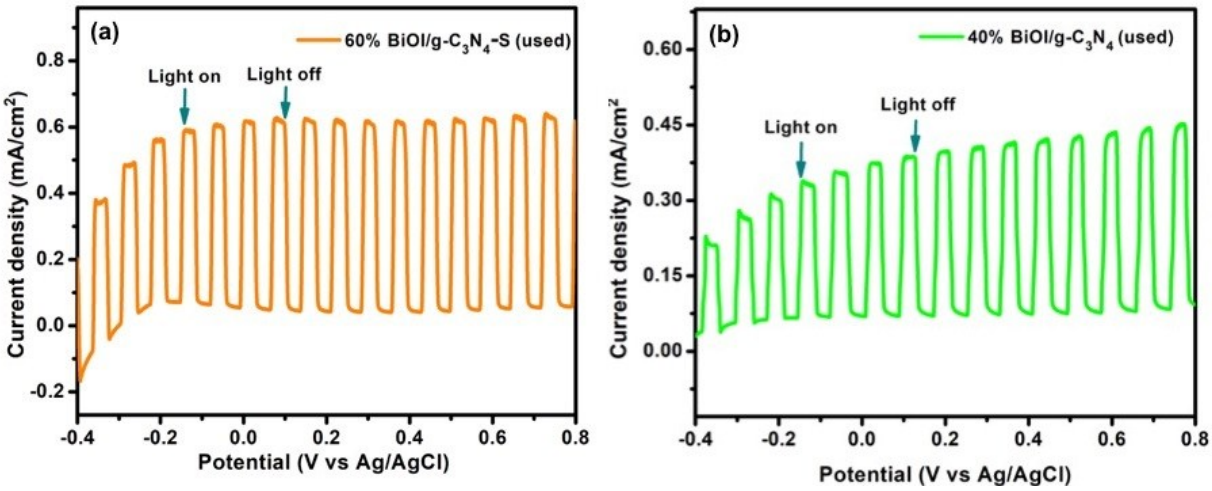

Figure S7. Photoelectrochemical re-use data for (a) g-C_3N_4-S/BiOI (orange) and (b) g-C_3N_4/BiOI (light green).

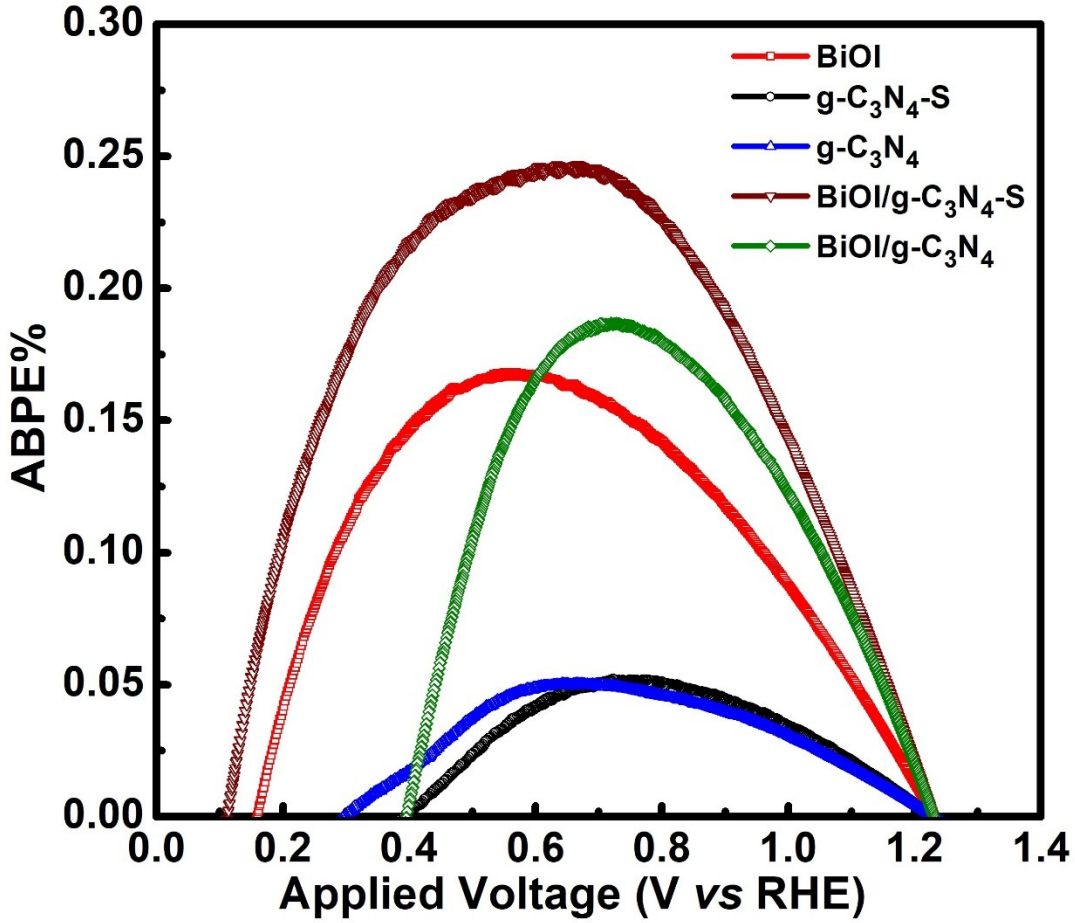

Figure S8. ABPE % *vs* RHE plot under AM1.5G light irradiation (100 mW cm^{-2}) for g-C_3N_4-S/BiOI (wine red), g-C_3N_4/BiOI (green), g-C_3N_4-S (black), g-C_3N_4 (blue), BiOI (g-C_3N_4-S).