Electronic supplementary information

Heterojunction of nanostructured α-Fe_2O_3/CuO for enhancement of photoelectrochemical water splitting

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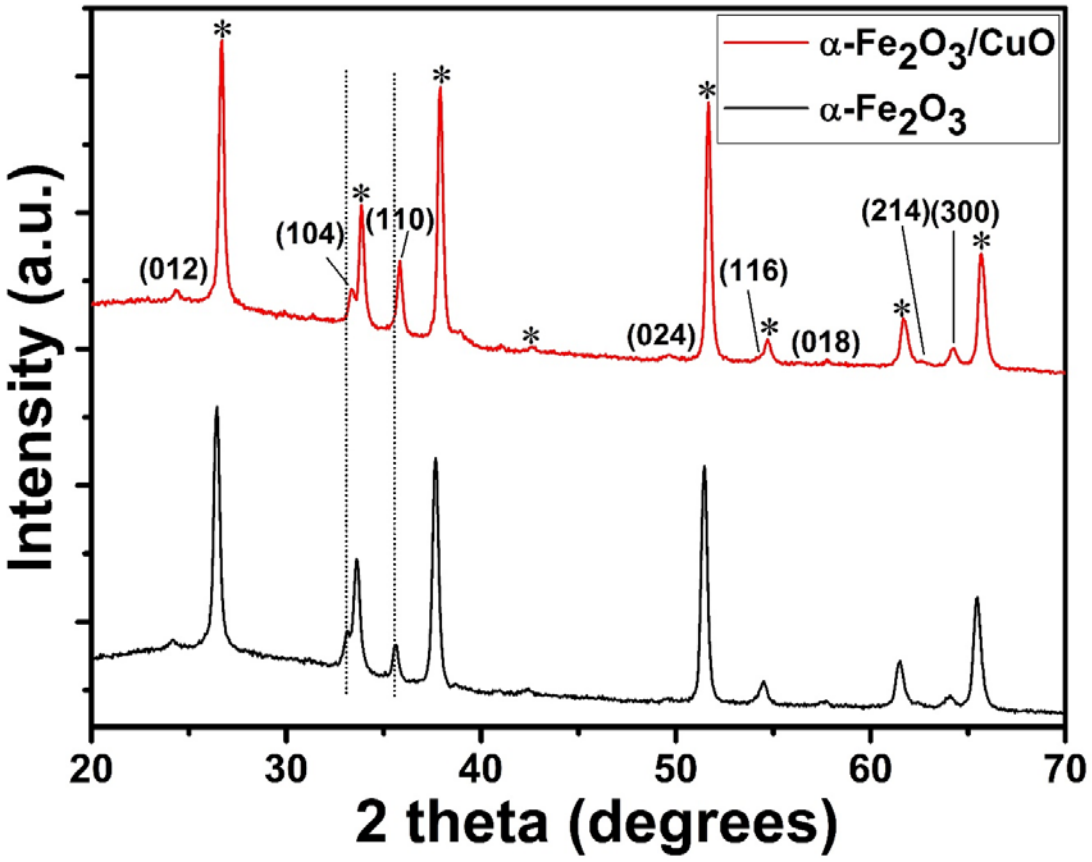

Fig. S1. XRD pattern of α-Fe_2O_3 and α-Fe_2O_3/CuO films indicating the peak shifts of (104) and (110) planes. Note: the * symbol represent the XRD peaks of FTO substrates.

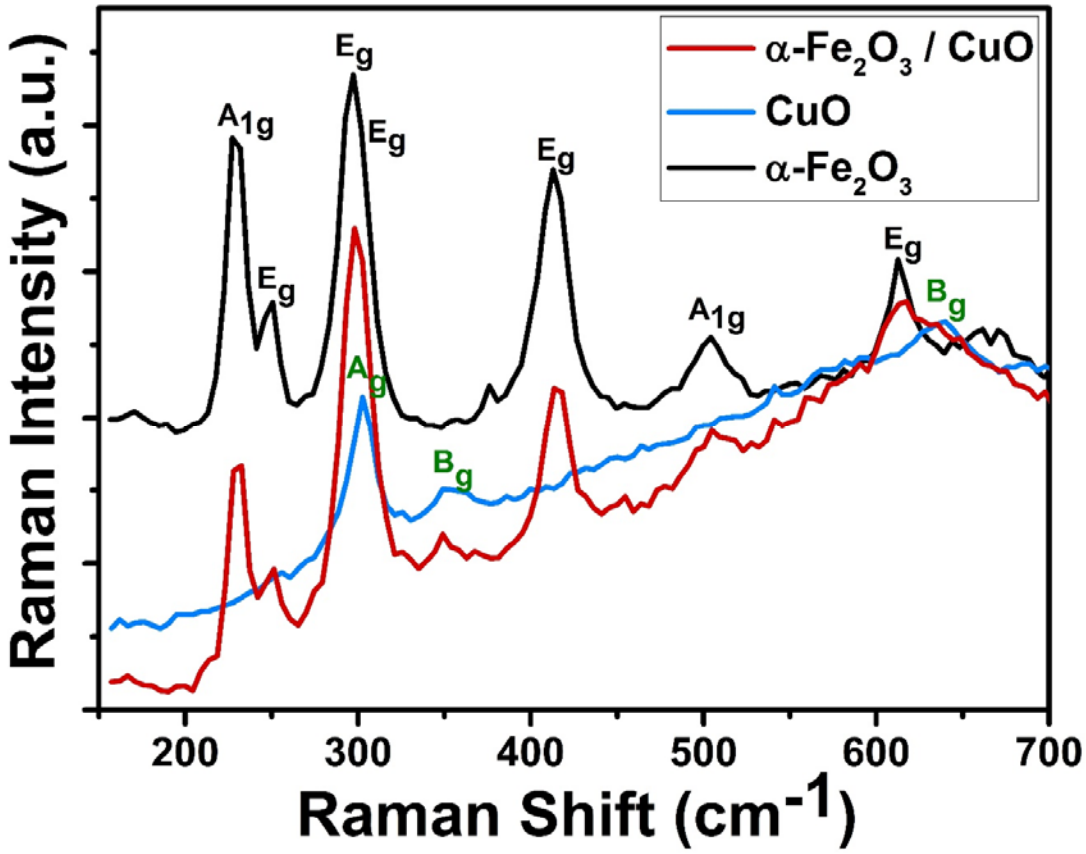

Fig. S2. Raman spectra of α-Fe_2O_3, CuO and α-Fe_2O_3/CuO films showing the difference in peaks intensities.

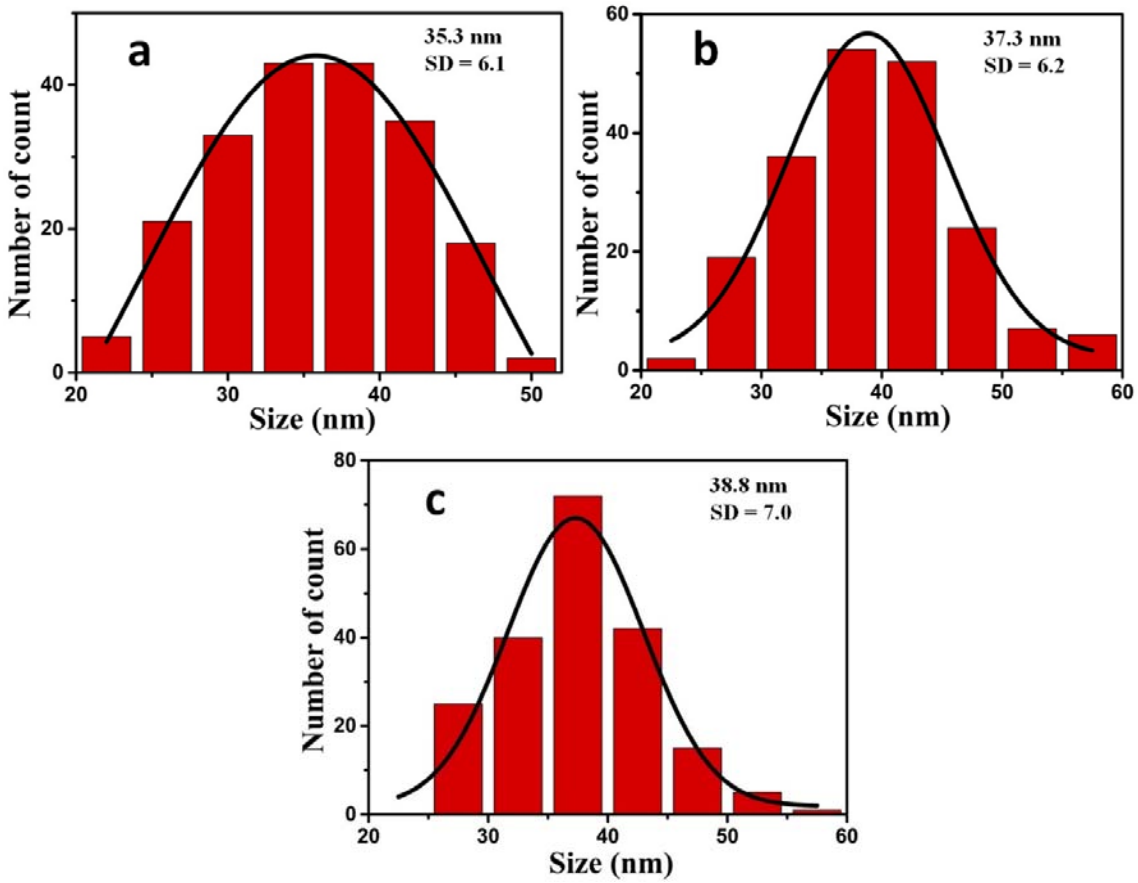

Fig. S3. Histogram of particle size distribution for (a) α-Fe_2O_3, (b) α-Fe_2O_3/CuO and (c) CuO films.

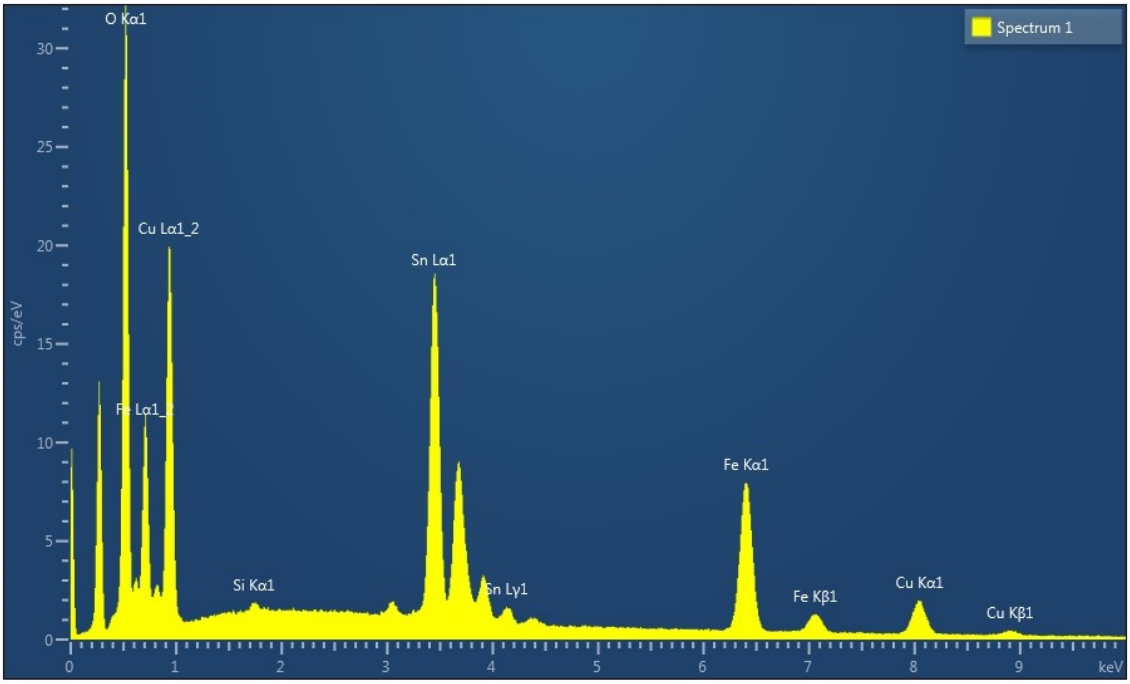

Fig. S4. EDS analysis carried out on the surface of α-Fe_2O_3/CuO films.

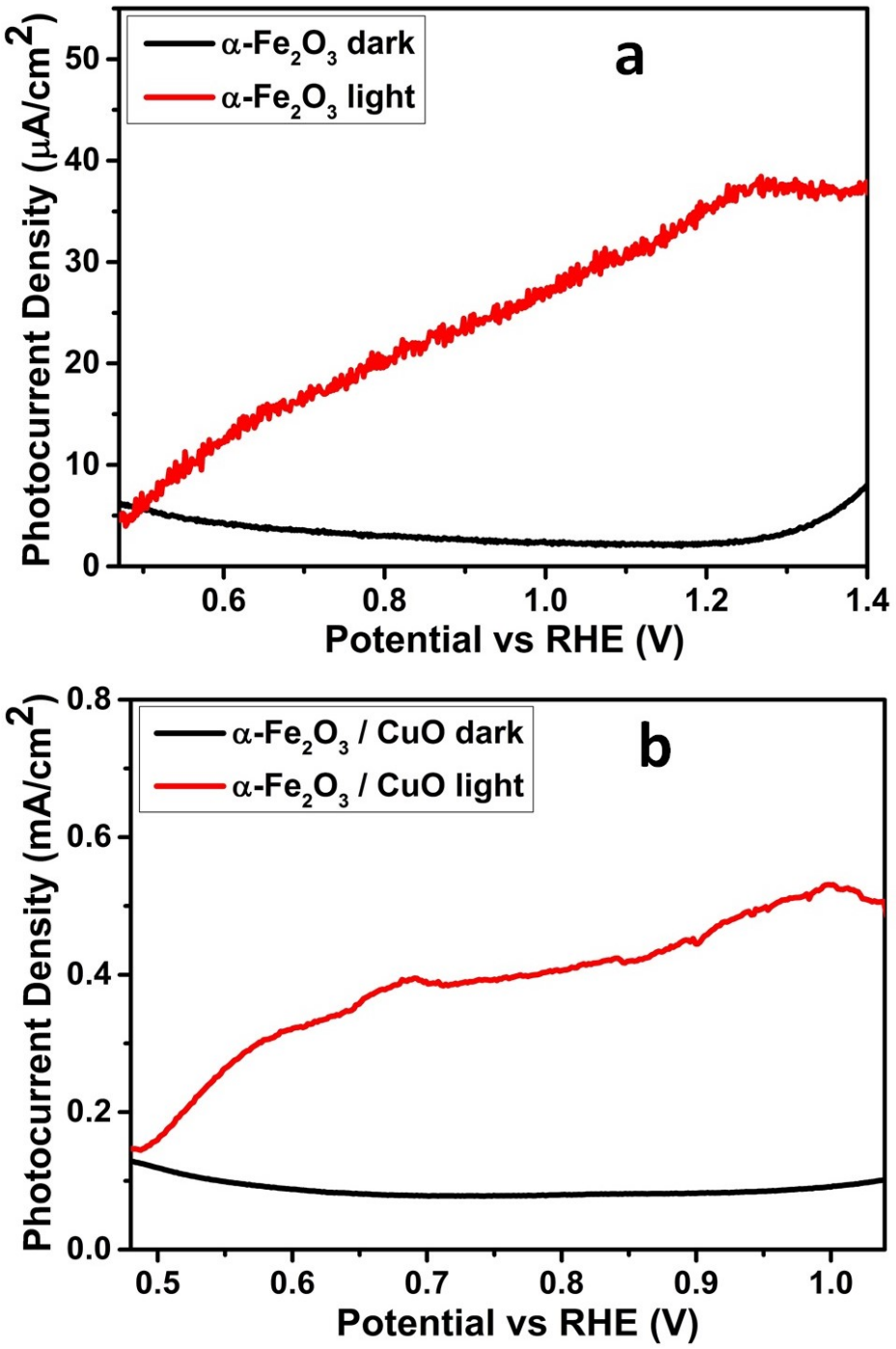

Fig. S5. Photocurrent density of (a) α-Fe_2O_3 and (b) α-Fe_2O_3/CuO showing the results for measurements done in dark and under illumination in each.

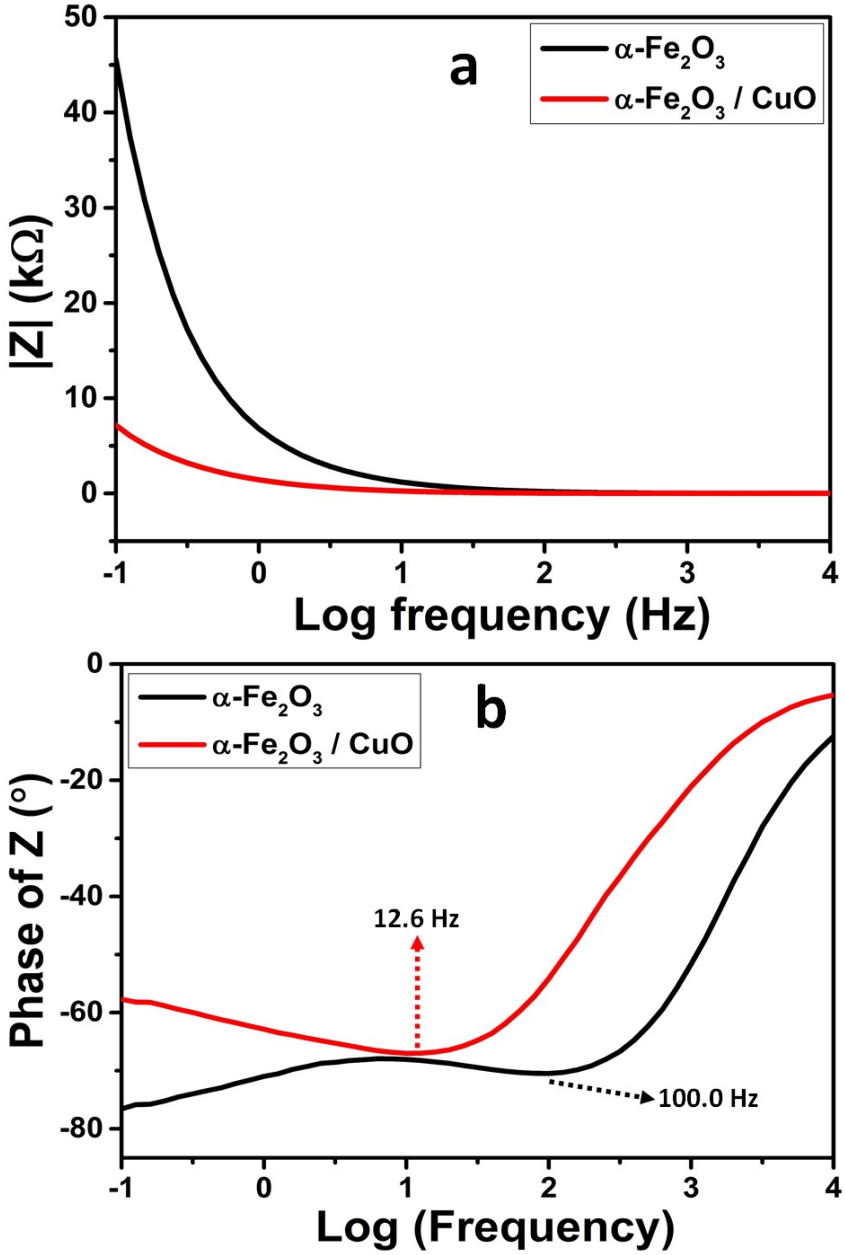

Fig. S6. Bode Plots for α-Fe_2O_3 and α-Fe_2O_3/CuO films of (a) Log frequency (Hz) vs. modulus of impedance |Z| and (b) Log frequency (Hz) vs. phase (°). Both plots agree with the Nyquist plots confirming a reduction of charge transfer resistance for α-Fe_2O_3/CuO over α-Fe_2O_3 photoanodes. Fig. S4(a) revealed significant drop in absolute impedance for α-Fe_2O_3/CuO at lower frequencies relative to α-Fe_2O_3 indicating reduction of charge transfer resistance. Similarly, Fig. S4(b) shows a phase peak shift to a lower frequency also depicting a drop of charge transfer resistance.

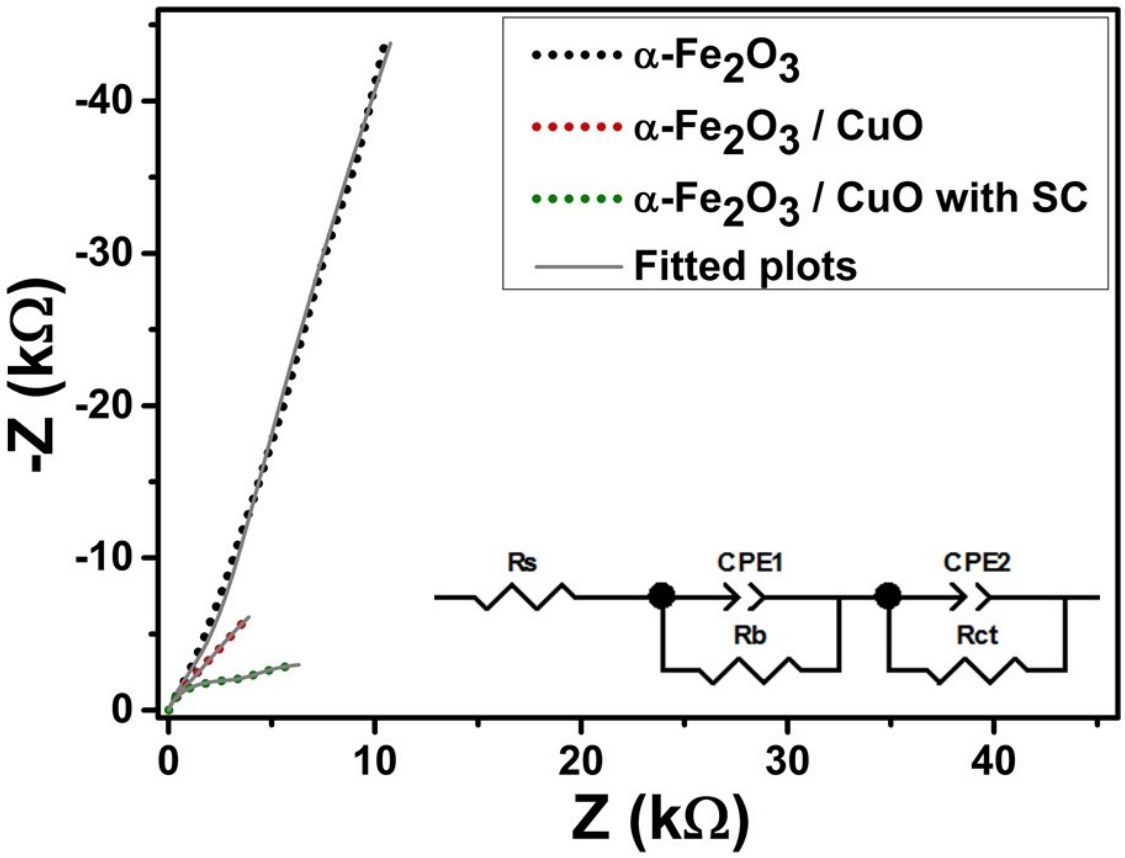

Fig. S7. EIS Nyquist plots for α α-Fe_2O_3, α-Fe_2O_3/CuO and α-Fe_2O_3/CuO (using 15% methanol as SR in the electrolyte) samples: the dotted coloured lines shows the raw experimental data acquired using VersaSTAT 3F potentiostat from Princeton Applied Research while the grey solid lines present the respective fitted curves of the films obtained with ZView software from Scribner Associates.