Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Synergies of co-doping in ultra-thin hematite photoanodes for solar water oxidation: In and Ti as representative case

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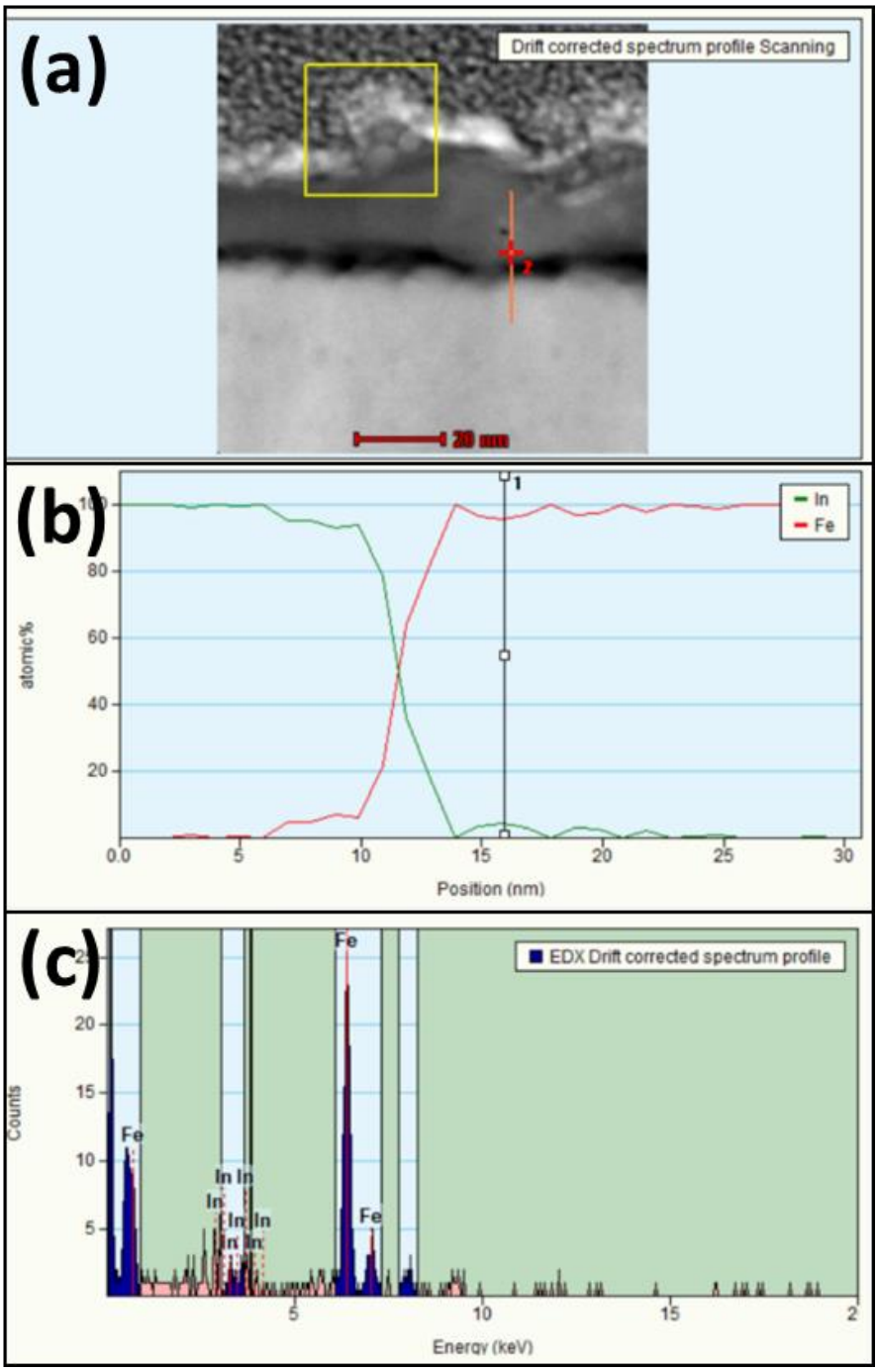

Figure S1: (a) STEM images for EDX line scan (b) respective EDX line scan clearly shows the distribution of Fe and In element in cross-section of α-Fe_2O_3 annealed at 500^{o}C (c) EDX spectra reveal that Fe and In are the main elements present within the selected line scan.

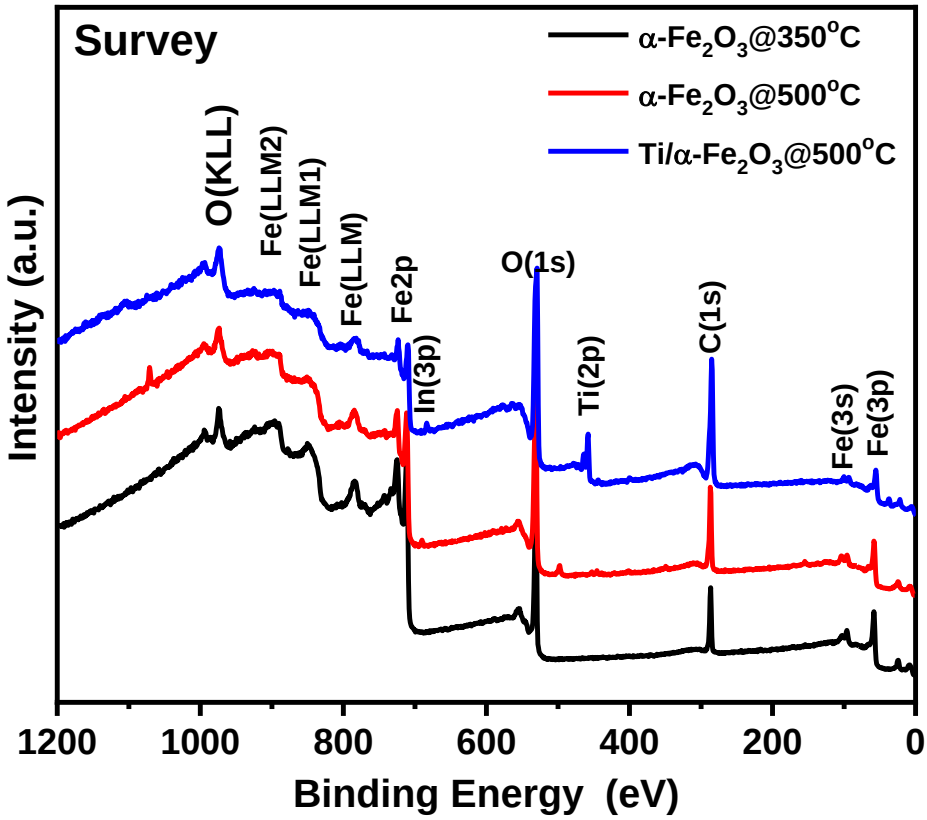

Figure S2: XPS survey scan recorded on α-Fe_2O_3 thin films annealed at 350°C and 500°C and Ti doped α-Fe_2O_3 annealed 500°C

v

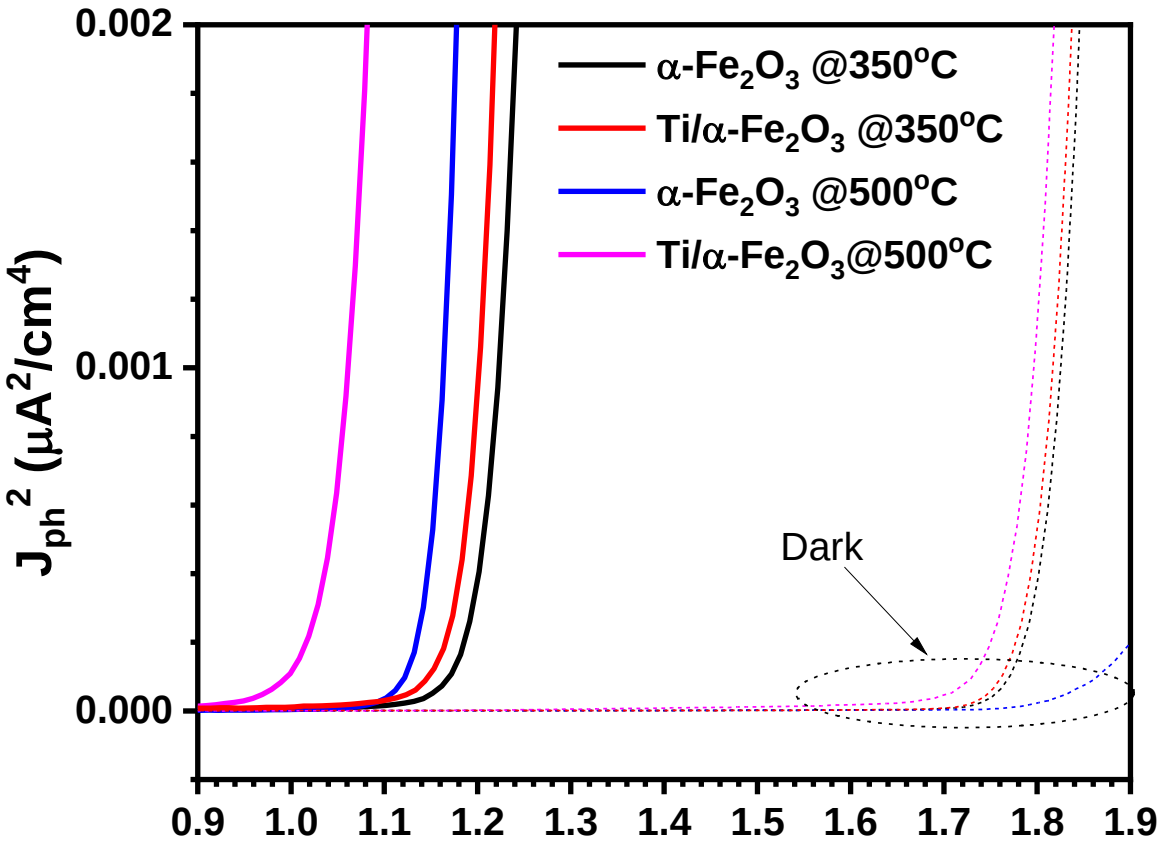

Figure S3: Butler plots under dark and 1 Sun illumination for α-Fe_2O_3 thin films annealed at 350°C and 500°C and Ti doped α-Fe_2O_3 annealed at 350 and 500°C under dark and 1 Sun illumination, in which the turn-on potential is defined as the value at which the extrapolation of the linear relationship between (current density)^2 and applied potential intercepts with (current density)^2 = 0.

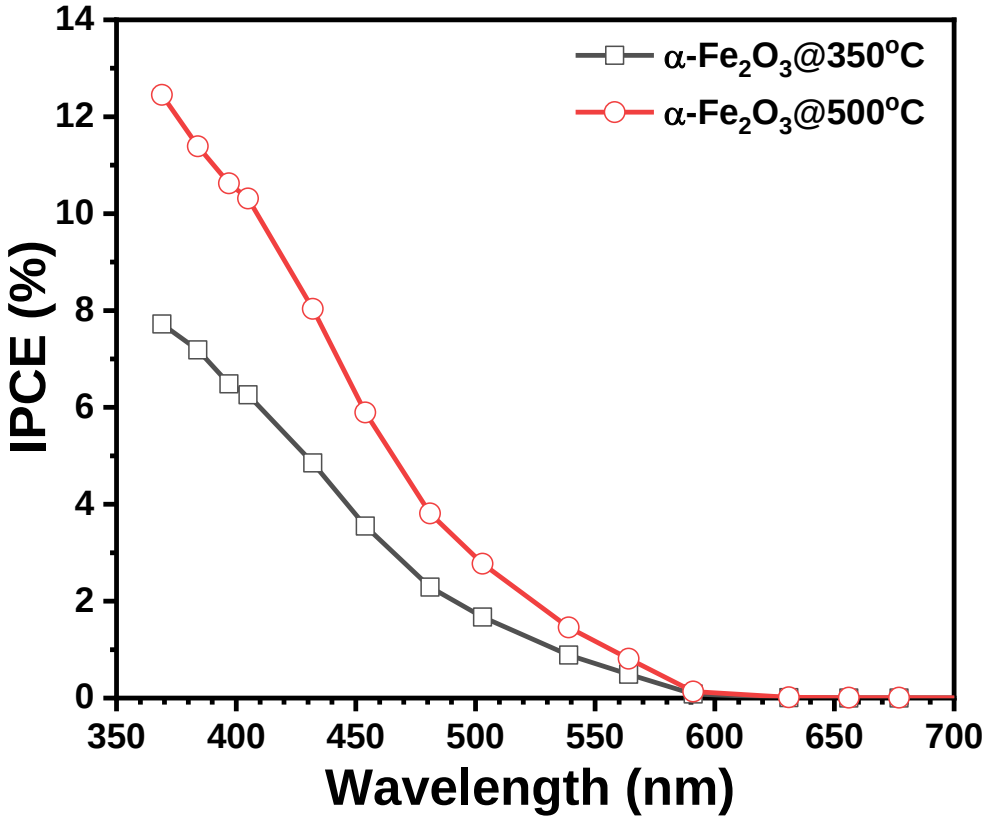

Figure S4: IPCE curves for α-Fe_2O_3 thin films annealed at 350°C (black) and 500°C (red) measured at 1.23V *vs.* V_{RHE}.

Table S1. Summary of photocurrent density at 1.23 V_{RHE} and 1.50 V_{RHE} and water oxidation onset potential under dark and 1 Sun illumination, donor densities and flat-band potentials calculated for all the four samples

	J_{ph} [μA/cm^2] @1.23V_{RHE}	J_{ph} [μA/cm^2] @1.5V_{RHE}	V_{onset} [V_{RHE}] (in dark)	V_{onset} [V_{RHE}] (in Light)	V_{fb} (V_{RHE})	N_d (cm^{-3})
α-Fe_2O_3@350°C	37	315	1.76	1.13	0.55	8.56×10^{18}
Ti/α-Fe_2O_3@350°C	70	554	1.71	1.10	0.49	9.46×10^{18}
α-Fe_2O_3@500°C	145	398	1.75	1.09	0.54	9.86×10^{18}
Ti/α-Fe_2O_3@500°C	290	602	1.71	0.93	0.52	9.97×10^{18}