Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Correlating flatband and onset potentials for solar water splitting on model hematite photoanodes

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Supporting Information

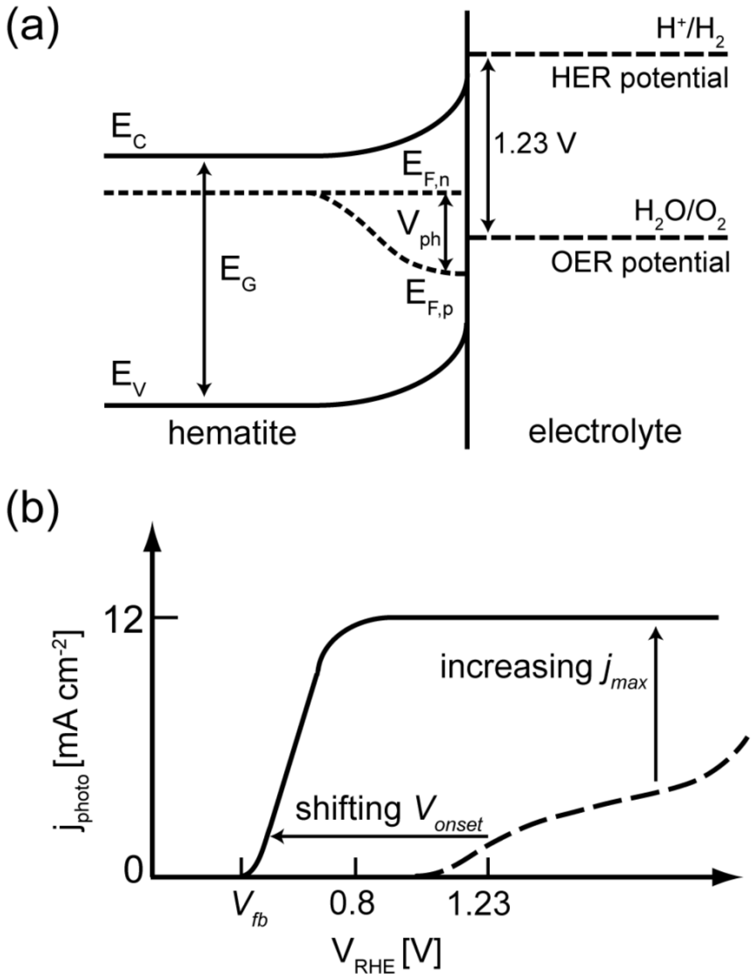

Figure S1. (a) Energy diagram for a hematite based photoanode in contact with an aqueous electrolyte after equilibration. The transfer of electrons from the hematite to the electrolyte results in upwards band bending within the space charge region in the semiconductor. (b) Comparison between the performance of an ideal hematite photoanode for water oxidation (solid trace, $V_{onset} = V_{fb}$, steep j_{photo} increase, j_{max} of 12 mA cm^{-2} reached at $V < 0.8$ V *vs*. RHE) and the present state-of-the-art hematite based photoanode (dashed trace, $V_{onset} = 1.15$ V *vs*. RHE, j_{max} of 4 mA cm^{-2} reached at $V = 1.54$ V vs. RHE) under simulated sunlight illumination.

Supporting Information

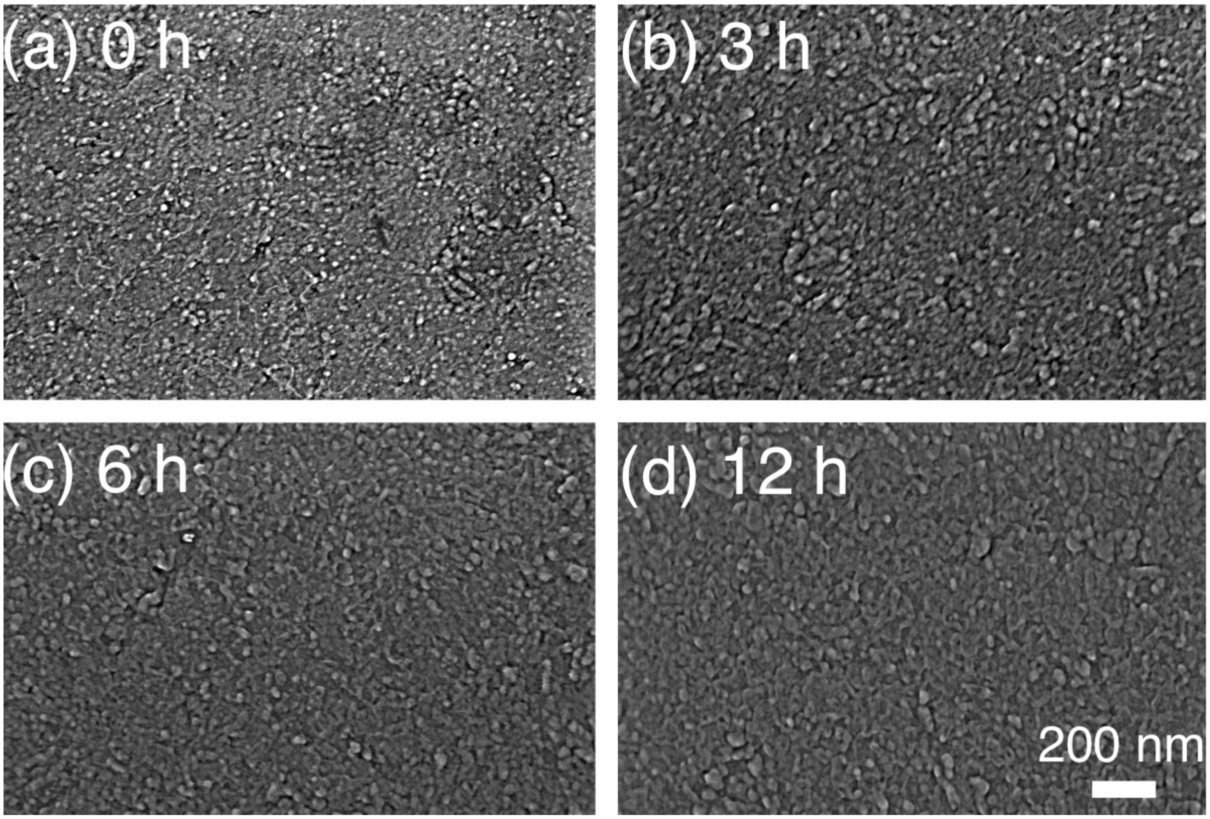

Figure S2. Top-view SEM images of hematite films deposited on ITO with varying t_{ox}: (a) 0 h, (b) 3 h, (c) 6 h, (d) 12 h. The magnification is the same for all images.

Supporting Information

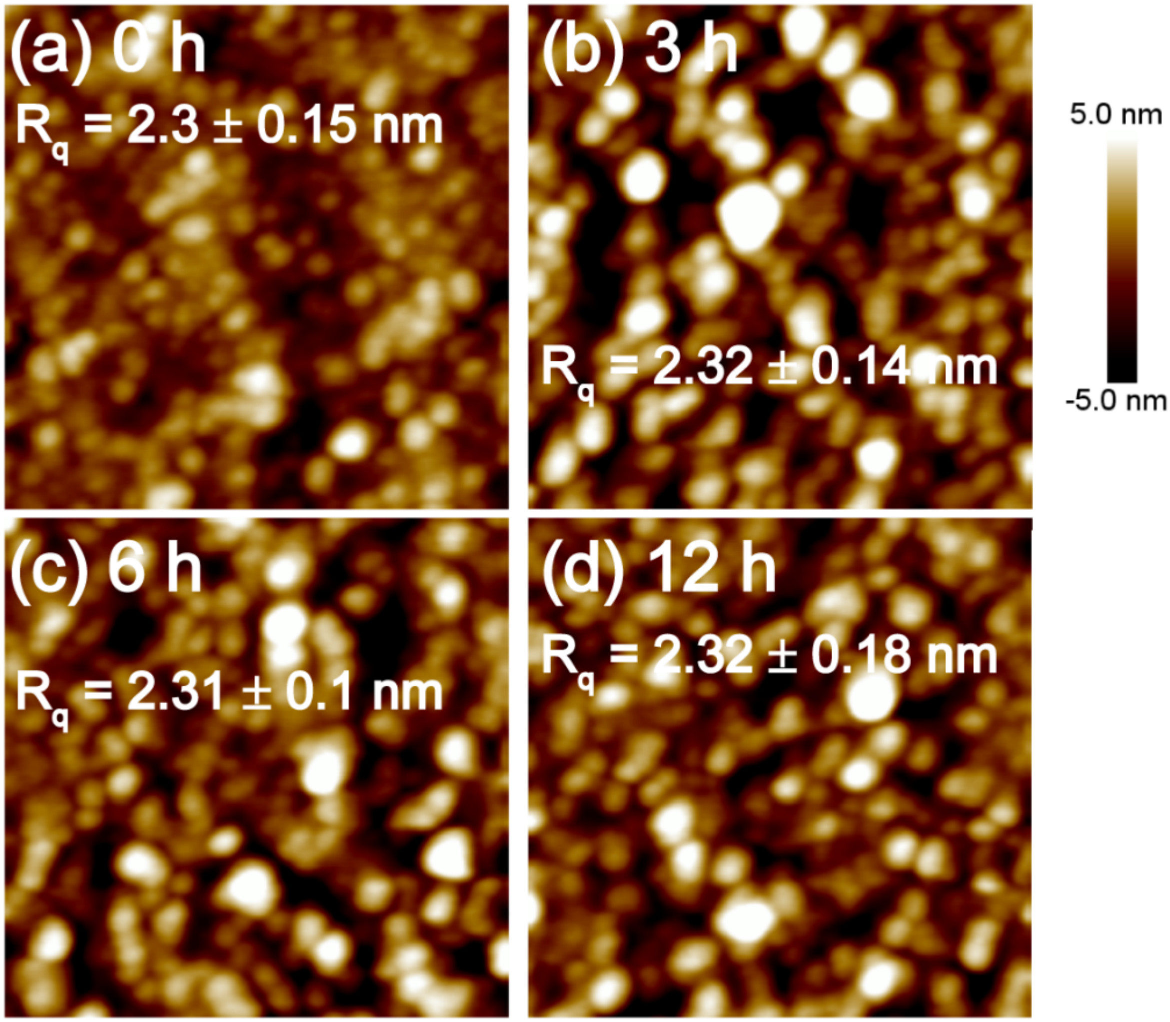

Figure S3. Representative tapping mode AFM scans of hematite films on ITO with varying t_{ox}: (a) 0 h, (b) 3 h, (c) 6 h, (d) 12 h. The scan size and the height range for all scans are 500 × 500 nm and 10 nm respectively. The root mean square roughness, R_q, is indicated for each sample. The thickness of all samples is 25 ± 2 nm, irrespective of the oxidation time, as determined by surface profile measurements.

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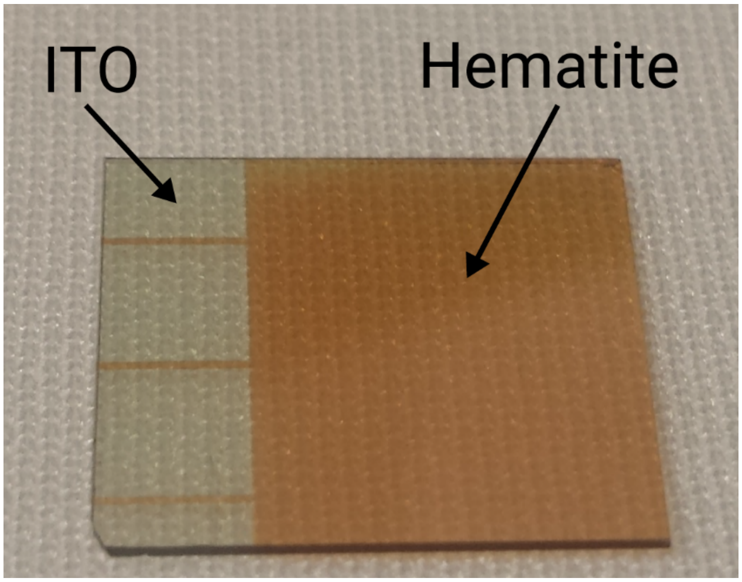

Figure S4. Photograph of 25 nm thick hematite film on top of ITO coated glass.