Supplementary information (SI)

YFO photocathode fabricated by spray pyrolysis for unassisted solar water splitting for generation of hydrogen fuel

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Table S1. Crystal structure parameters of the samples YFO-500, YFO-550, YFO-600 and YFO-650.

Sample	Crystallite size (nm)	Lattice strain (10^{-3})	Interplanar spacing (d_{121}) (nm)
YFO-500	---	---	---
YFO-550	35.94	1.76	2.6952
YFO-600	49.41	1.28	2.7003
YFO-650	49.18	1.31	2.6964

Figure S1. Custom-made reactor vessel for hydrogen evolution test with a fused silica quartz viewport. The *o*-YFO working electrode and Pt mesh counter electrode are connected by a single outer wire

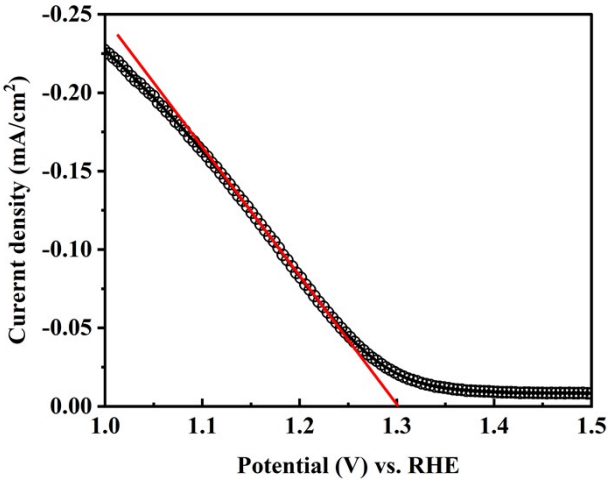

Figure S2. Current density plot as a function of potential vs. RHE for determination of the onset potential of YFO-600

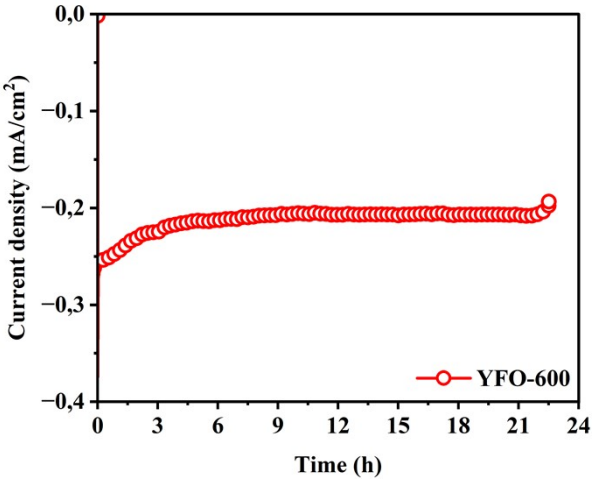

Figure S3. Chronoamperometric curve of $YFeO_3$ film with illumination for 24 hours at -0.3 V vs. Ag/AgCl.

Equation for Faradaic efficiency determination

$$Faradaic\ efficiency = \frac{H_2(exp.)}{H_2(theo.)} = \frac{H_2\ (exp.)}{H_2(photo)} = \frac{H_2\ (exp.)}{\left(\frac{J_{photo} \times A \times t}{e} \Big/ 4\right) \Big/ N_A} \times 100\% \quad \text{(S1)}$$

Where H_2 *(exp.)* and H_2 *(theo.)* are the amounts of hydrogen, respectively, measured experimental by GC and determined theoretically from *i-t* curve. $J_{photo.}$ (A/cm^2) is the photocurrent density, t (seconds) is the measurement time, A (cm^2) is the area of the photoelectrode illuminated, e (1.602×10^{-19} C) is the charge of an photogenerated electron and N_A (6.02×10^{23} mol^{-1}) is the Avogadro constant.