Supporting Information

Facile Fabrication of Tin-Doped Hematite Photoelectrodes – Effect of Doping on Magnetic Properties and Performance for Light-Induced Water Splitting

*Jiri Frydrych[1], Libor Machala[1], Jiri Tucek[1], Karolina Siskova[1], Jan Filip[1], Jiri Pechousek[1], Klara Safarova[1], Martin Vondracek[2], Jung Hwa Seo[3], Oldrich Schneeweiss[4], Michael Grätzel[5], Kevin Sivula[5, *], and Radek Zboril[1, *]*

[1]Regional Centre of Advanced Technologies and Materials, Departments of Experimental Physics and Physical Chemistry, Faculty of Science, Palacky University, 17. listopadu 12, 771 46 Olomouc, Czech Republic

[2]Institute of Physics, Academy of Sciences of the Czech Republic, v. v. i., Cukrovarnicka 10, 162 00 Prague 6, Czech Republic

[3]Department of Material Physics, College of Natural Science, Dong–A University, Busan, 604–714, Korea

[4]Department of Material Physics, College of Natural Science, Dong–A University, Busan, 604–714, Korea

[5] Institute of chemical sciences and engineering, École Polytechnique Fédérale de Lausanne, Station 6, 1015 Lausanne, Switzerland

* Corresponding authors: tel. +41216937979, fax: +41216934111, e-mail: kevin.sivula@epfl.ch; tel.: +420585634947, fax: +420585634761, e-mail: zboril@prfnw.upol.cz

Supporting Figures

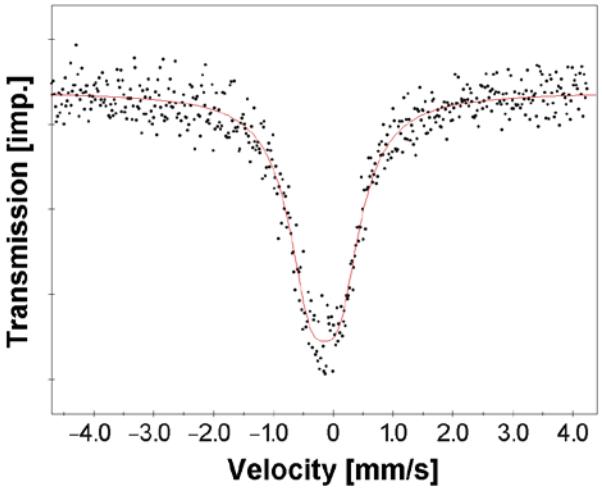

Figure S1: ^{119m}Sn TMS spectrum of a powdered Sn doped α-Fe_2O_3 with doping level of 16:100.

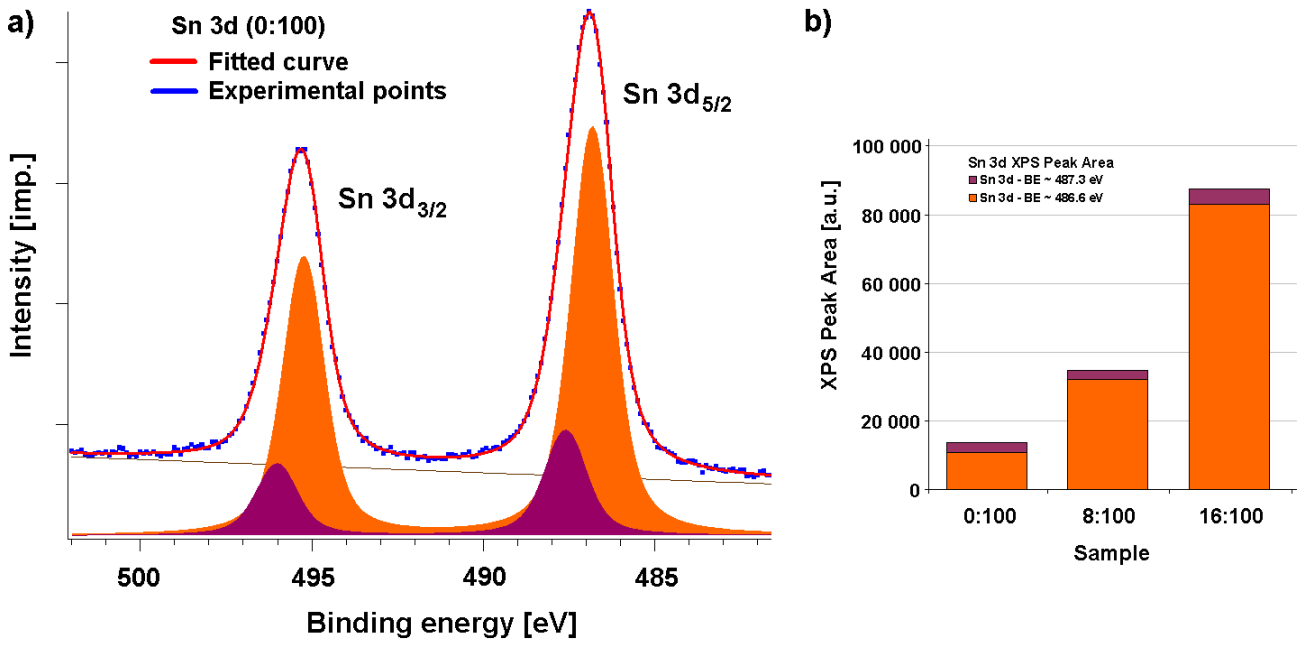

Figure S2: (a) Fit XPS plot of intentionally undoped sample (0:100) and (b) relative surface areas of fit Sn 3d XPS peaks. Presented XPS data are cleaned from Auger electrons and satellites. The specimens were sputtered by argon ion gun for 10 min.

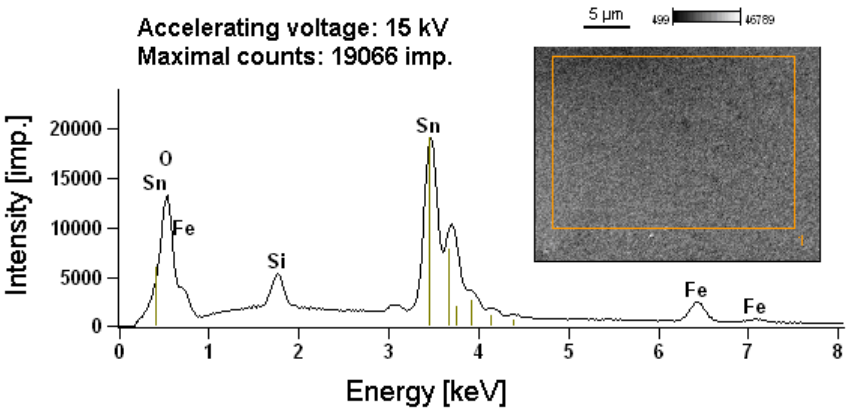

Figure S3: EDX of Sn-doped sample with 8:100 ratio plot showing a presence of Fe, O, Sn and Si atoms. With respect to a high penetration of X-rays, a majority of Sn and Si atoms originates from the substrate. Therefore it was not possible to observe a clear trend in growth of Sn peak intensity with increased doping fraction by EDX. The spectrum above belongs to Sn-doped sample with 8:100 ratio.

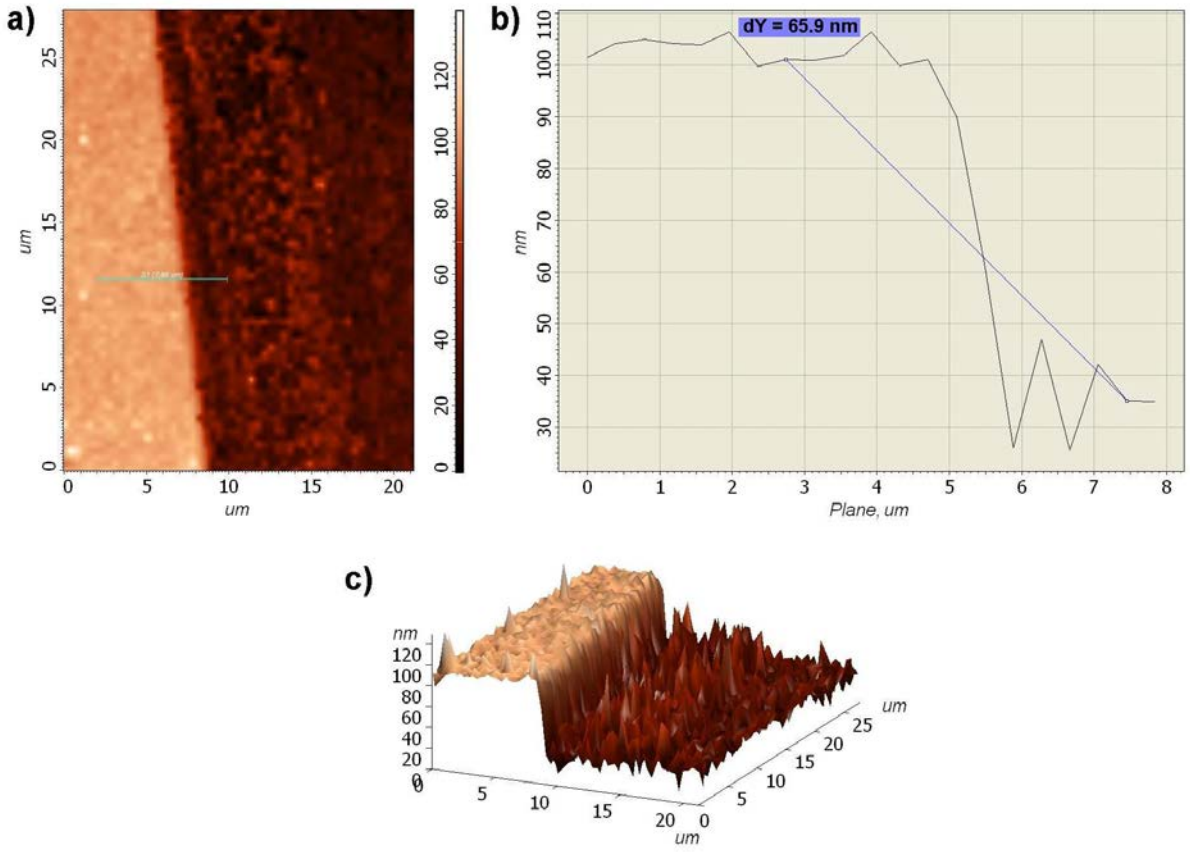

Figure S4: AFM 2D top view image (a) of needle scratch and its profile (b) supplemented with its 3D topography (c). This is a scan of Sn-doped hematite film (8:100). Scratch height measurement enables to estimate the overall film thickness (~65 nm). Similar results were obtained within the whole series.

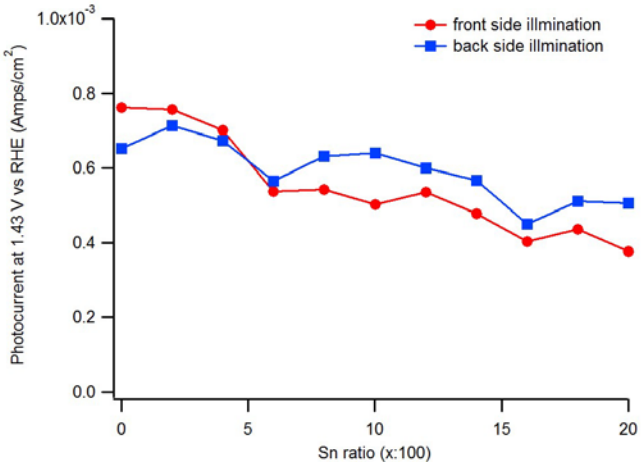

Figure S5: Photocurrents at 1.43 V vs. RHE versus the Sn doping (with both front and back illumination) for the series of samples treated at 800 °C.

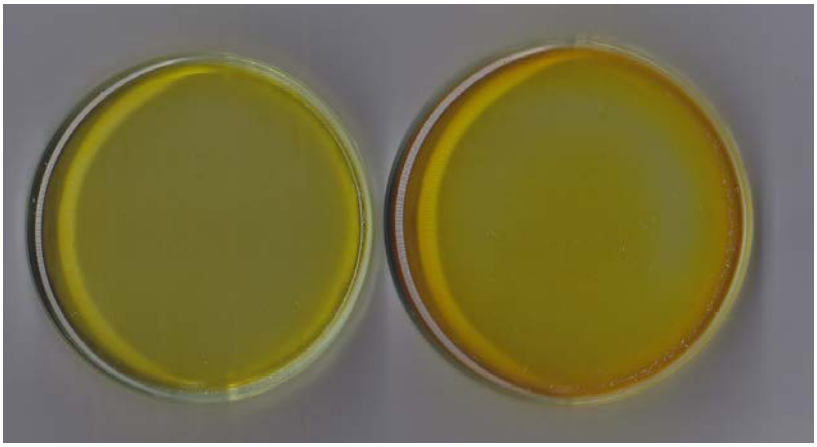

Figure S6: Bright solution of FeCl3 (left) gets darker after addition of $SnCl_2$.

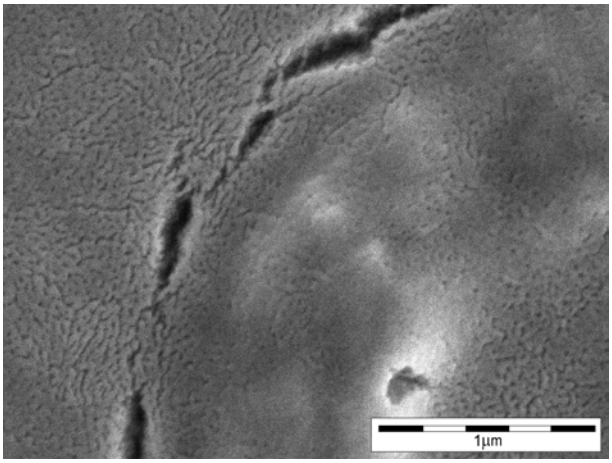

Figure S7: Visible cracking occurred in case of Sn-doped samples with a tin loading of 20:100.