## **Supporting Information**

## Hazy Al<sub>2</sub>O<sub>3</sub>-FTO Nanocomposites: A Comparative Study with FTO-Based Nanocomposites Integrating ZnO and S:TiO<sub>2</sub> Nanostructures

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Step 1: spin coating Al<sub>2</sub>O<sub>3</sub> nanoparticles

**Step 2:** deposit FTO film by ultrasonic spray pyrolysis

Figure S1: Schematic drawing of the two-step process (not to scale) for fabricating Al<sub>2</sub>O<sub>3</sub>-FTO nanocomposites.



**Figure S2**: SEM image of a 1 wt % S:TiO<sub>2</sub>-FTO nanocomposite presenting the cross section of a nanoparticle agglomerate, which resembles and thus is approximated as a truncated circular pyramid.



**Figure S3**: (a) AFM image of a 1 wt % ZnO-FTO nanocomposite; right panel summarizes the height profiles of the six grains indicated; (b) AFM image of a 1 wt % S:TiO<sub>2</sub>-FTO nanocomposite; right panel summarizes the height profiles of the six grains indicated; (c) AFM image of a 1 wt %  $Al_2O_3$ -FTO nanocomposite; right panel summarizes the height profiles of the six grains indicated.

**Table S1**: The values of equivalent radius  $r_{eq}$  of the grains 1–12 marked in Figure 9 in the main text.

	r <sub>eq</sub> (nm)		r <sub>eq</sub> (nm)		r <sub>eq</sub> (nm)
grain 1	1800	grain 5	1060	grain 9	98.6
grain 2	1590	grain 6	919.5	grain 10	170.75
grain 3	1220	grain 7	881.7	grain 11	360.9
grain 4	1340	grain 8	610.9	grain 12	253.2