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Supporting Information

Disordered Layers on WO_3 Nanoparticles Enable Photochemical Generation of Hydrogen from Water

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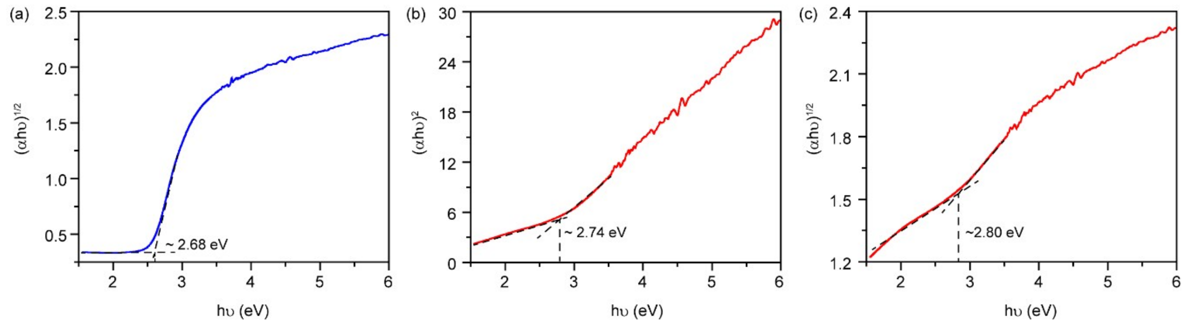

Figure S1. Tauc plots of (a) WO_3 and (b) LT-WO_3 as direct band gap semiconductor and (c) as indirect band gap semiconductor.

Since there was no pigment introduced to LT-WO_3, the increased in absorption background after the intrinsic absorption edge can be attributed to the change in electronic structure comparing to WO_3 that led to the obvious color change in the sample (**Figure 3b**). For a crystalline semiconductor, the Tauc equation is followed at the band edge in the zone near the optical absorption: $\alpha h\upsilon = A(h\upsilon - Eg)^{n/2}$. Since WO_3 is an indirect bandgap semiconductor, the bandgap of WO_3 was calculated with the n value of 4 from the Tauc plot which is 2.63 eV. For LT-WO_3, since we cannot identify the type of semiconductor (direct bandgap or indirect bandgap), both direct and indirect was plotted. Since the direct plot showed more fitted than indirect plot, the band gap of LT-WO_3 was determined based on that which is 2.74 eV.

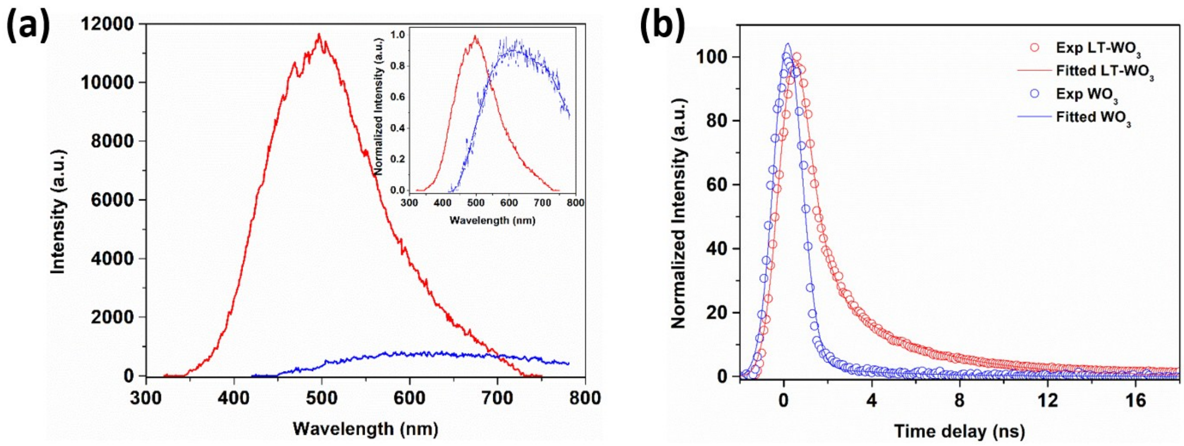

Figure S2. (a) Steady state and (b) time-resolved PL spectra on solid-state WO_3 (blue) and LT-WO_3 (red). Excited at 267 nm at room temperature. Inset in (a) is the corresponding normalized PL spectra.

Reference

1. Yi, Z. *et al.* An orthophosphate semiconductor with photooxidation properties under visible-light irradiation. *Nat Mater* 9, 559-564 (2010).