Electronic Supplementary Material (ESI) for RSC Advances.

Enhanced Photoluminescence of Potassium-doped Tungsten Oxide by Acetone Exposure

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S1. The Raman spectra acquired in ambient air.

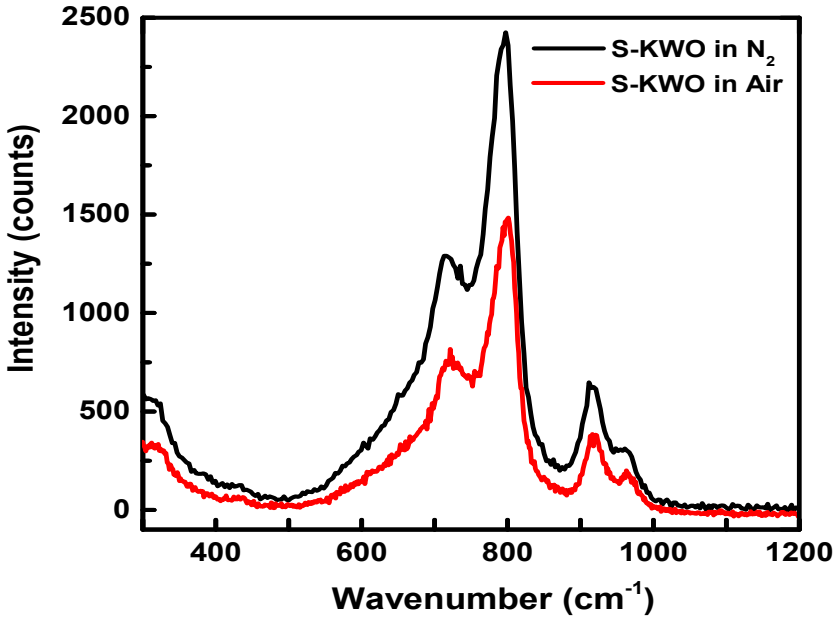

Figure S1. Raman spectra for S-KWO nanorods in air and in nitrogen with the 532 nm laser excitation inside the high pressure cell.

S2. Deconvolution of Raman spectra of NS-KWO and S-KWO from 500 cm^{-1} to 875 cm^{-1} range.

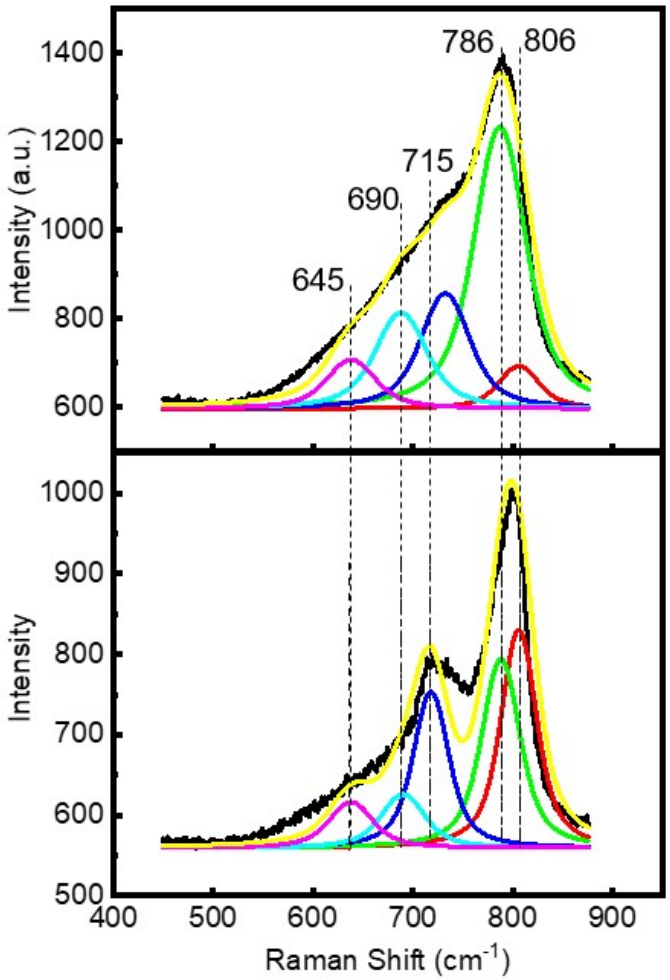

Figure S2. Deconvolution of Raman spectra of K_xWO nanorod samples with the 532 nm laser excitation. Spectra are obtained (a) on NS-KWO and (b) S-KWO in nitrogen. The spectra were fitted using Lorentzian plus Gaussian.

S3. UV-Vis spectra of S-$K_{1.8}WO$.

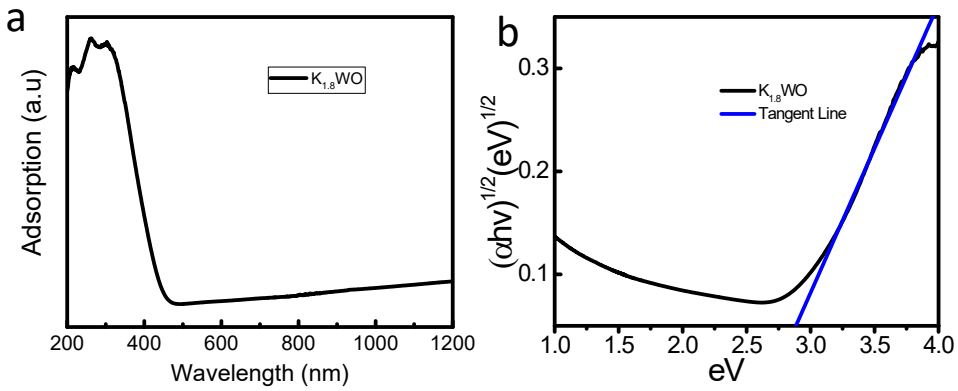

Figure S3. (a) UV-Vis spectra of S-$K_{1.8}WO$ and (b) the corresponding Tauc plot.

The bandgap was calculated via UV-Vis spectroscopy using Tauc plot: $\alpha h\nu = A(h\nu - E_g)^{n/2}$, where α, ν, h, E_g, and A are absorption coefficient, light frequency, bandgap energy, Plank constant, and a constant, respectively.[1] For WO_3, the value of n is 4 for the indirect transition.[2] E_g of WO_3 was calculated to be 2.9 eV.

S4. Fig. S4 shows a blank experiment in the absence of the KWO material conducted on glass substrate in acetone vapor in Linkam cell excited using a 532 nm laser. There is no fluorescence observed.

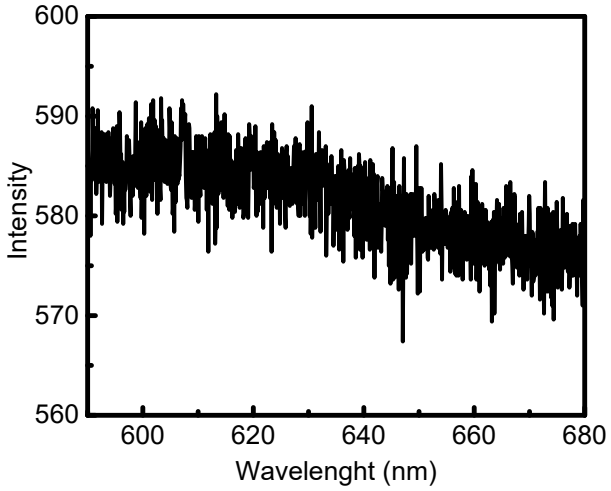

Figure. S4. Spectrum from the background experiment. The signal was collected from glass slide surface in acetone irritated by a 532 nm laser. There is no fluorescence signal observed.

S5. PL spectra of NS-KWO and S-KWO with and without N2/acetone are shown in Figure S5.

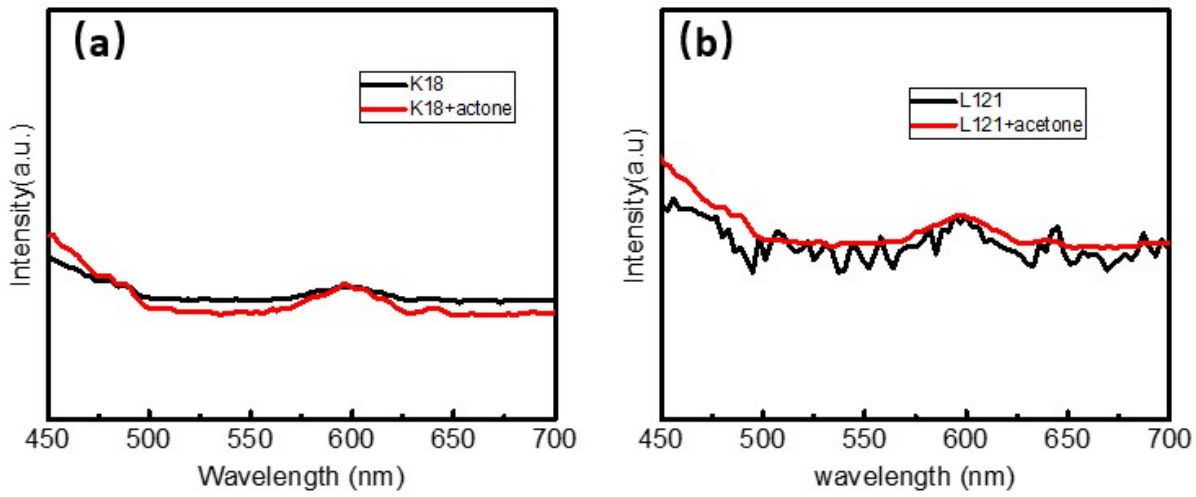

Figure. S5. Photoluminescence spectra of NS-KWO and S-KWO excited by a 405 nm laser with (Black) and without acetone (red), respectively.

Reference:

(1) Li, N.; Teng, H.; Zhang, L.; Zhou, J.; Liu, M. Synthesis of Mo-Doped WO_3 Nanosheets with Enhanced Visible-Light-Driven Photocatalytic Properties. *RSC Adv.* **2015**, *5*, 95394-95400.

(2) He, Y.; Wu, Z.; Fu, L.; Li, C.; Miao, Y.; Cao, L.; Fan, H.; Zou, B. Photochromism and Size Effect of WO_3 and WO_3−TiO_2 Aqueous Sol. *Chem. Mater.* **2003**, *15*, 4039-4045.