Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

Tunable Polaron-induced Coloration of Tungsten Oxide *via* a Multi-step Control of Physicochemical Property for Gaseous F Detection

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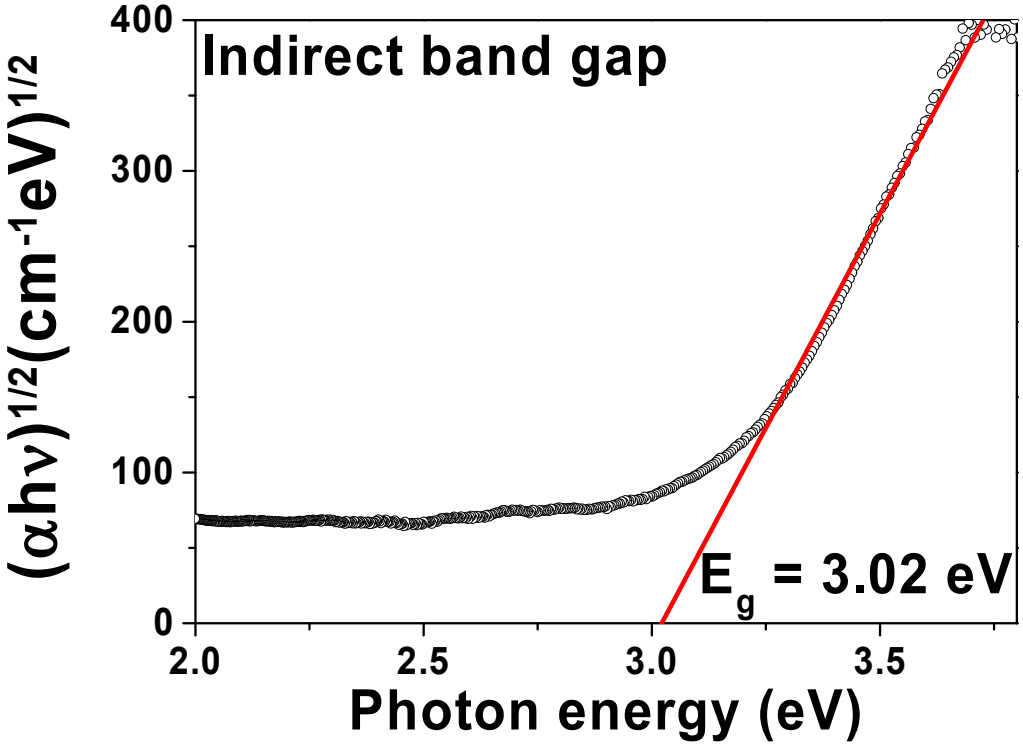

Figure S1. The extracted optical band gap of tungsten oxide from Tauc plot

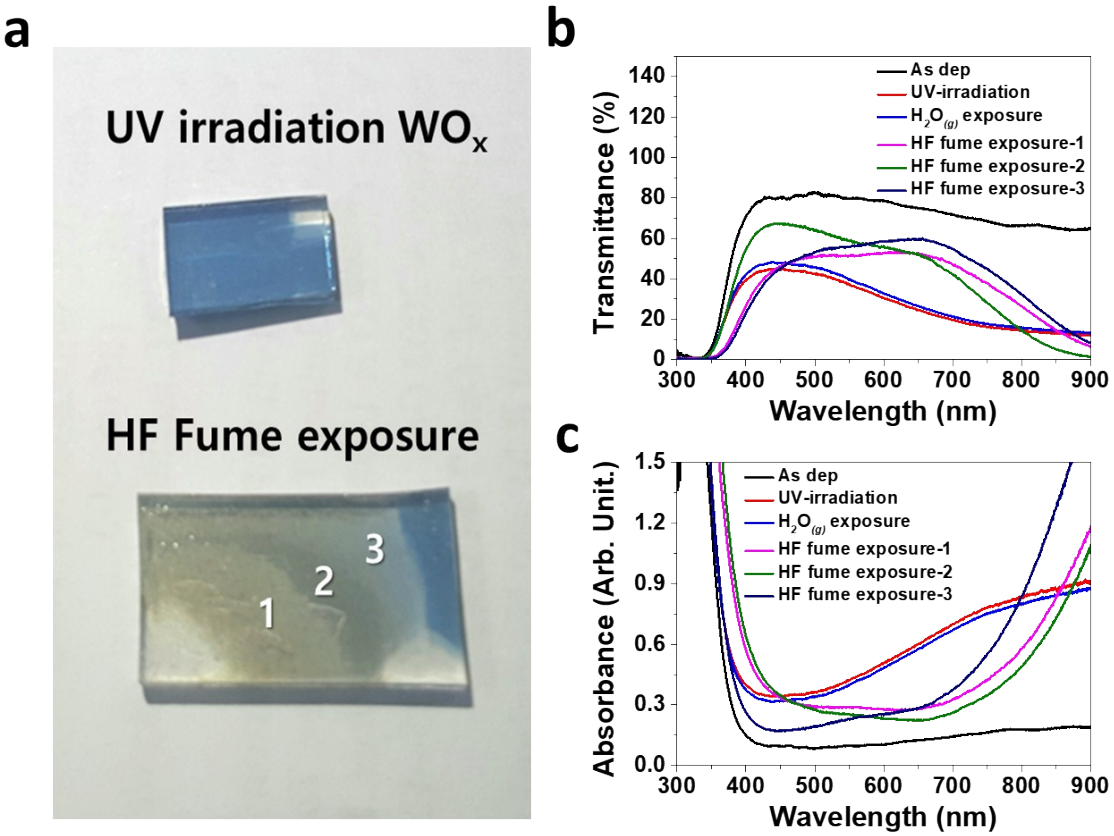

Figure S2. a) Photoimages, b) transmittance, and c) absorbance spectra of of pristine, H-WO_{3-x}, and F- WO_{3-x} films formed on FTO substrate

In Fig. S2, The sample was exposed to HF vapor by heating the 40 % HF solution in air atmosphere and also, was exposed to pure water vapor by boiling DI water to confirm the selectivity against of H_2O. The experiment was performed by boiling HF solution (40% concentration) in the hood at 50 Celsius degree (Video attached). The bleaching of tungsten oxide by HF exposure was observed within about 10 minutes. In the case of H_2O exposure, however, any change of colorimetric was not observed while water boiling was proceeded at 100 Celsius degree for 1 hour. It is shown that the polaron-induced H-WO_{3-x} is selective for the fluorine species in gas phase XeF_2 and HF since H-WO_{3-x} did not react with H_2O.

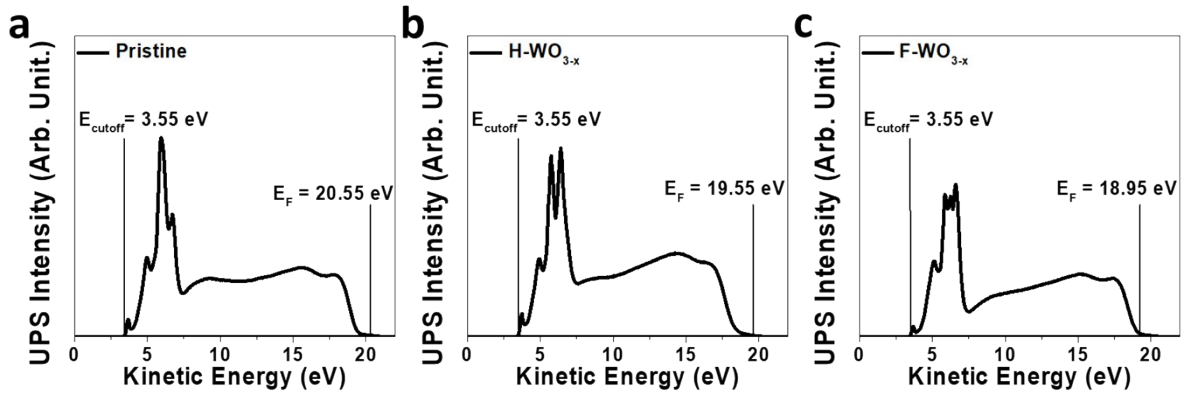

Figure S3. UPS spectra of a) pristine, b) H-WO_{3-x}, and c) F-WO_{3-x}, respectively.