Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Rh-Catalyzed WO_3 with Anomalous Humidity Dependence of Gas Sensing Characteristics

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Figure S1. Kwon-Il Choi *et al.*

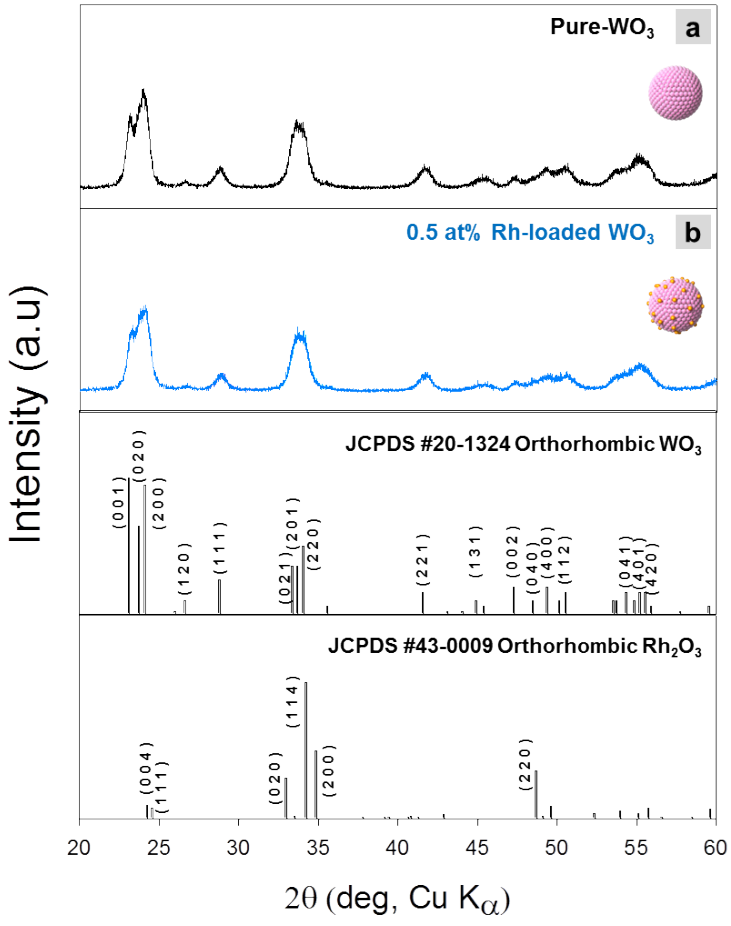

Figure S1. X-ray diffraction (XRD) patterns for the as-synthesized WO_3 HWs and Rh-loaded WO_3 HWs.

Figure S2. Kwon-Il Choi *et al.*

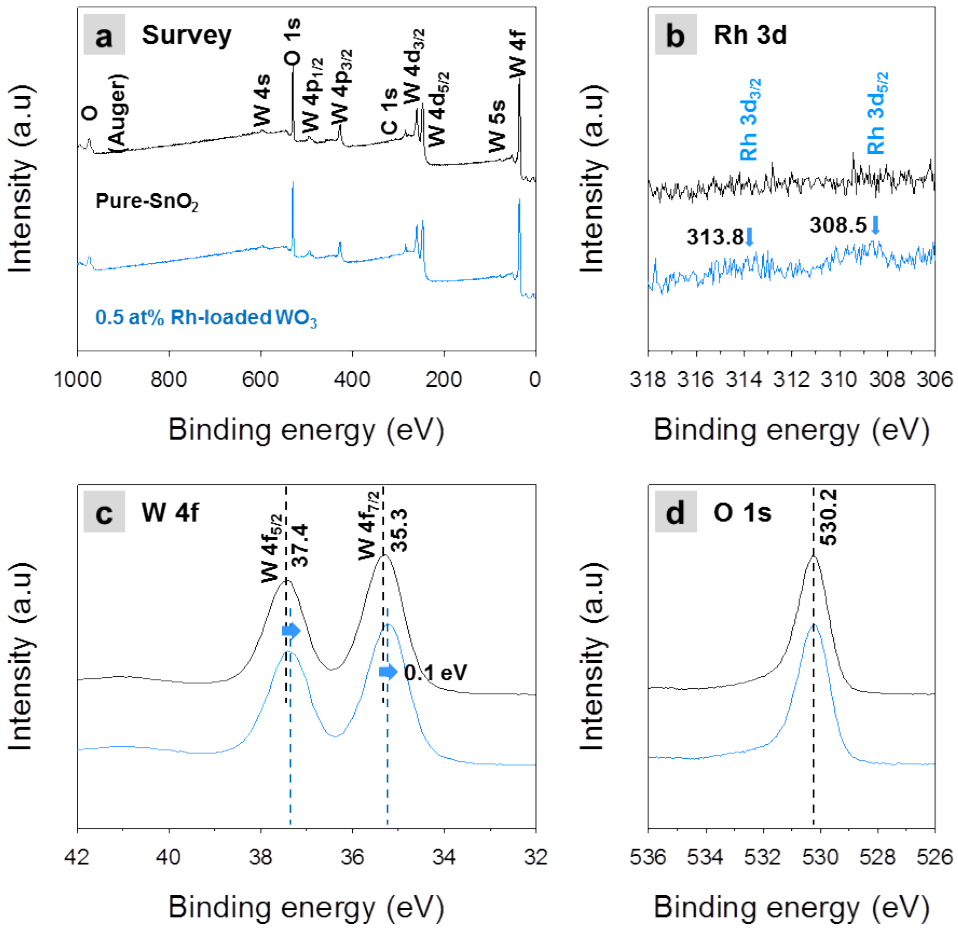

Figure S2. XPS spectra of WO_3 and Rh-loaded WO_3 HWs, respectively. (a) Survey scanning energy spectra. (b) Rh 3d binding energy spectra. (c) W 4f binding energy spectra. (d) O 1s core level spectra.

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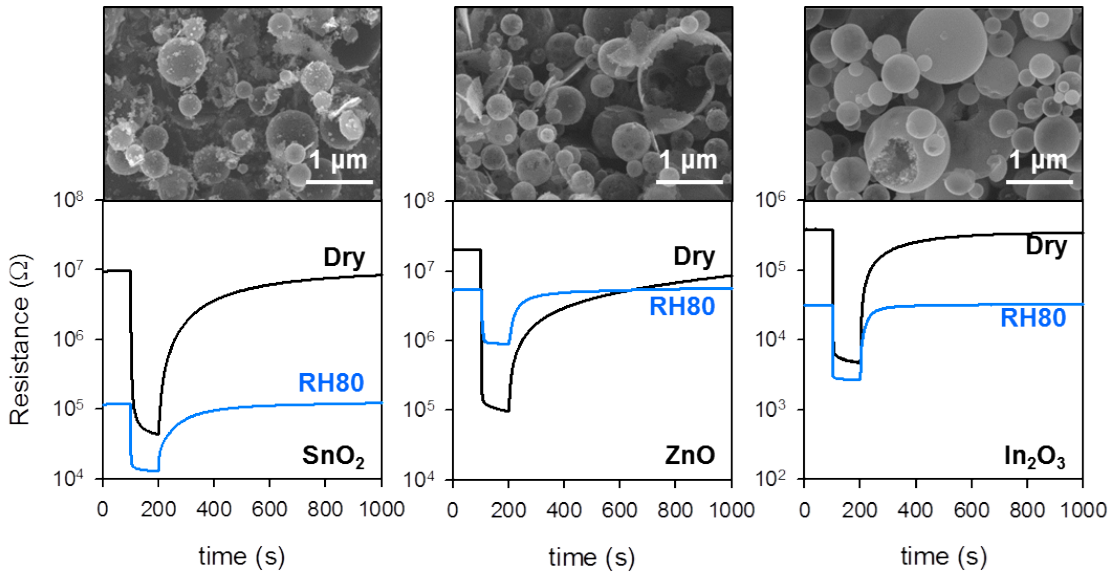

Figure S3. SEM images and sensing behaviors of SnO_2, ZnO, and In_2O_3 prepared by spray pyrolysis to 10 ppm acetone gas at 400 °C in the dry and humid atmosphere (RH 80%).

Figure S4. Kwon-Il Choi *et al.*

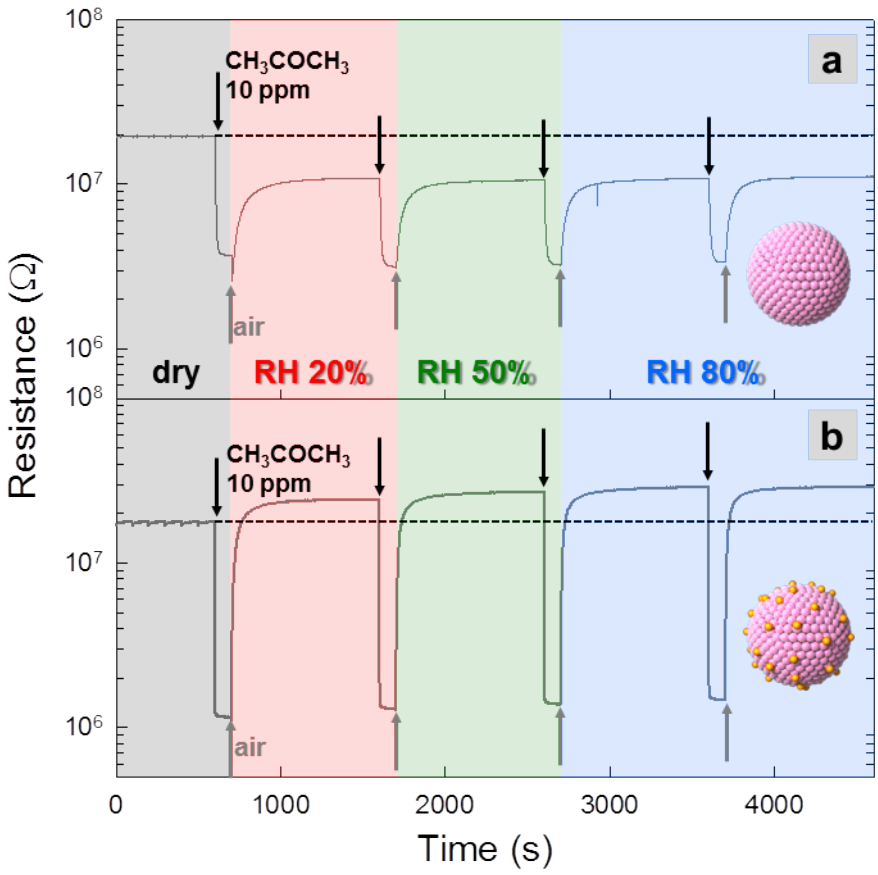

Figure S4. Sensing transients of (a) pure and (b) 0.5 at% Rh-loaded WO_3 HWs toward 10 ppm acetone with increasing ambient humidity (0-80% RH).

Figure S5. Kwon-Il Choi *et al.*

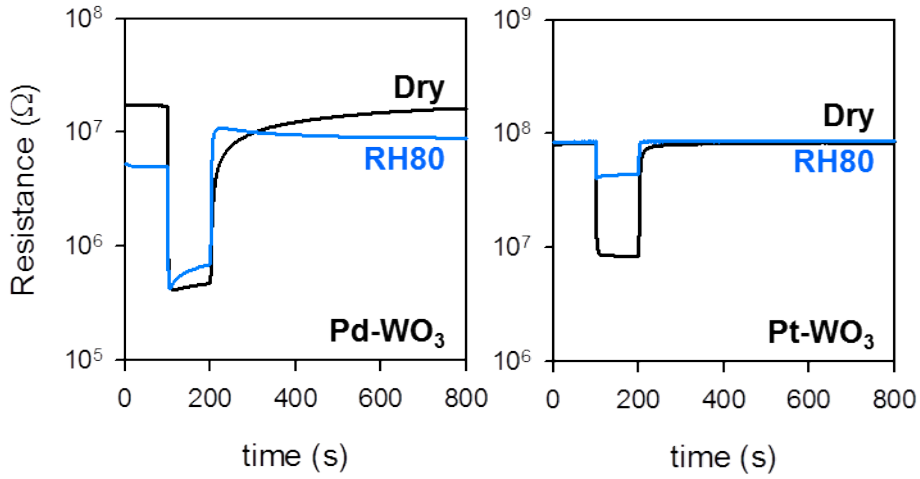

Figure S5. Sensing behaviors of Pd and Pt-loaded WO_3 prepared by spray pyrolysis to 10 ppm acetone gas at 400 ^{o}C in the dry and humid atmosphere (RH 80%).

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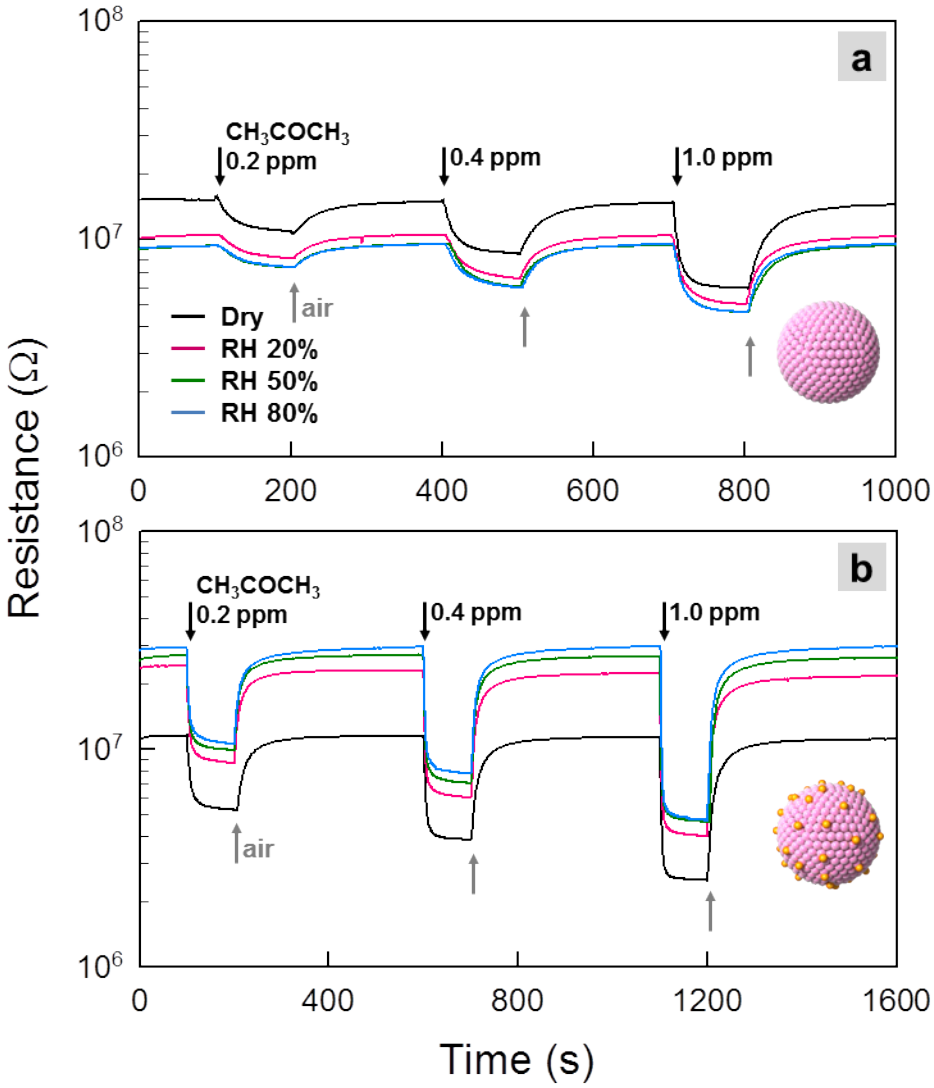

Figure S6. Acetone sensing transients of (a) pure and (b) 0.5 at% Rh-loaded WO_3 HWs to 0.2-1.0 ppm at 400 °C in dry and humid (RH of 20, 50 and 80%) atmospheres.

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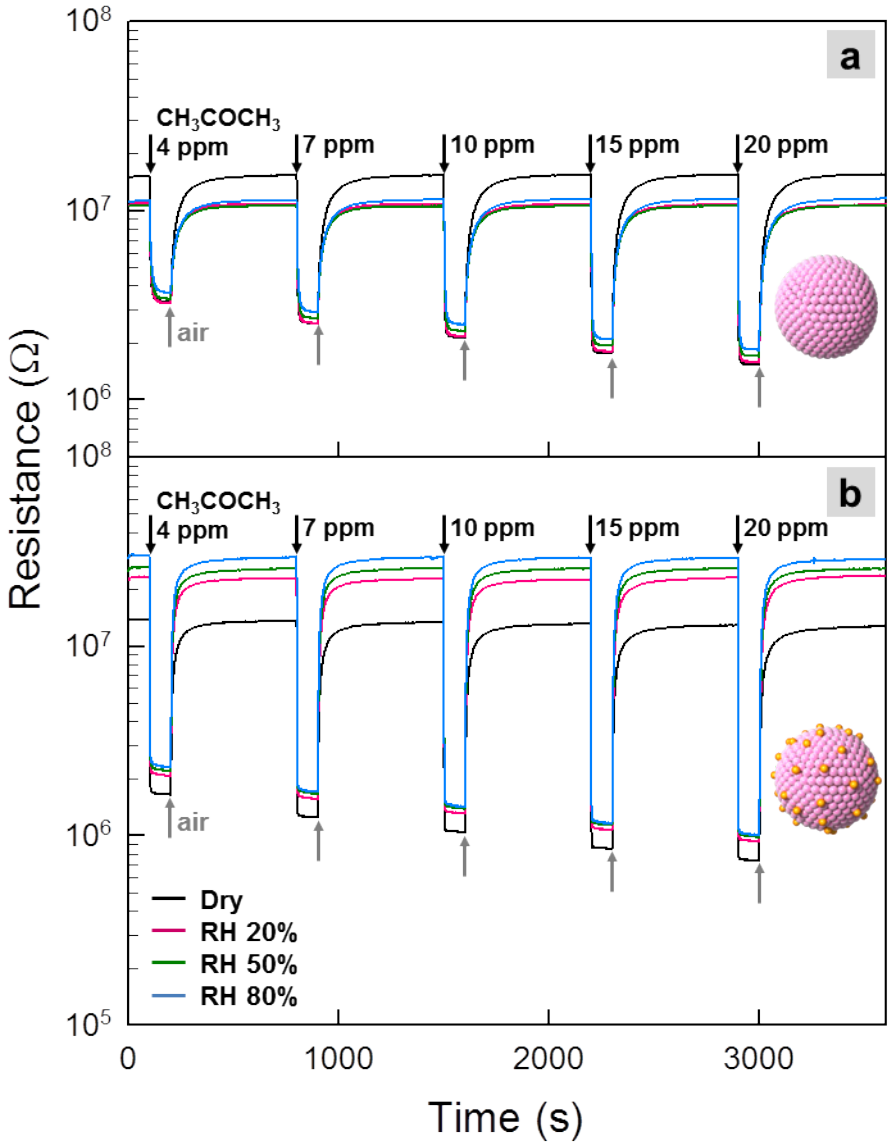

Figure S7. Acetone sensing transients of (a) pure and (b) 0.5 at% Rh-loaded WO_3 HWs to 4-20 ppm at 400 °C in dry and humid (RH of 20, 50 and 80%) atmospheres.

Table S1. Kwon-Il Choi *et al.*

Table S1. The detection limit for diagnosis of diseases, gas concentrations for measurement, and R_a/R_g of pure WO_3 and Rh-loaded WO_3 hollow spheres at 400 °C in 80% RH.

	Diagnosis conc.	Measured conc.	R_a/R_g Pure WO_3	R_a/R_g Rh-loaded WO_3
CH_3COCH_3 (Diabetes)	1.8 ppm[1]	4 ppm	3.07	13.1
CO (Bronchiectasis)	8.6 ppm[2]	20 ppm	1.15	2.28
NH_3 (Renal failure)	14.7 ppm[3]	20 ppm	3.46	3.46
H_2S (Halitosis)	0.5 ppm[4]	1 ppm	4.30	7.27
Benzene (Lung cancer)	10 ppb[5]	20 ppb	1.11	1.78
Toluene (Lung cancer)	10 ppb[5]	20 ppb	1.22	1.61
Xylene (Lung cancer)	10 ppb[5]	20 ppb	1.34	1.49
NO (Asthma)	100 ppb[6]	200 ppb	1.22	1.40

Reference

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