Supporting Information

Fabrication of a Micro-Electromechanical System-based Acetone Gas Sensor Using CeO₂ Nanodot-Decorated WO₃ Nanowires

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Table S1. The correspondence of	different Ce	e- <i>d</i> -WO ₃ samples	with the added
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Nanowire sample	Amount of the added (NH ₄) ₂ Ce(NO ₃) ₆		
Ce-d-WO ₃ -1	40 mM		
Ce-d-WO ₃ -2	8 mM		
Ce-d-WO ₃ -3	4 mM		
Ce-d-WO ₃ -4	1.6 mM		

amount of (NH4)2Ce(NO3)6 in synthetic process



Figure S1. SEM images of the surfaces of (a) Ce-d-WO₃-4, (b) Ce-d-WO₃-3, (c) Ce-d-

WO₃-2, and (d) Ce-*d*-WO₃-1 nanowire.



Figure S2. (a) The magnification of two peaks in the XRD patterns of samples; (b) Representative XRD patterns of Ce-*d*-WO₃-3 and Ce-*d*-WO₃-4 nanowires; (c) The recorded XPS full spectra of the WO₃ and Ce-*d*-WO₃-2; (d) The XPS Ce 3d spectrum of the WO₃ nanowire; The XPS W 4f (e) and O 1s (f) spectrum of the WO₃ nanowire.



Figure S3. (a) A schematic illustration of the MEMS-based sensing device; (b) An optical microscope image of the fabricated gas sensing device after binding.



Figure S4. Dynamic response curves towards acetone gas of the Ce-*d*-WO₃-1, Ce-*d*-WO₃-2, and Ce-*d*-WO₃-3, pure WO₃ nanowire-based devices at (a) 150 °C, (b) 200 °C, (c) 250 °C, and (d) 300 °C, respectively; (e-f) The response curves towards 0.5-2.5 ppm acetone gas of the Ce-*d*-WO₃-2 at 225 and 275 °C.



Figure S5. (a) The responses of these four sensors to 2.5 ppm acetone at the optimum operating temperature of 250 °C; (b) Response of the Ce-*d*-WO₃-2 sample facing other various reducing gases (2.5 ppm), namely formaldehyde, toluene, ammonia, hydrogen sulphide, nitrogen dioxide, and methane compared with 2.5 ppm acetone at 250 °C.

Table S2. The response value of Ce-d-WO₃-2 to 0.5 ppm acetone under 20 and 80 RH%. The value of \triangle were calculated as below equation: $\triangle = (V_{20} - V_{80})/V_{20}$

	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
V ₂₀ =20 RH%	1.29	1.29	1.27	1.27	1.28	1.27
V ₈₀ =80 RH%	1.24	1.24	1.24	1.23	1.24	1.25
$\bigtriangleup\%$	3.8	3.9	2.4	3.1	3.1	1.6



Figure S6. (a) The energy band structure of WO₃/CeO₂ heterojunctions before contact; (b) O₂-TPD profiles of Ce-d-WO₃-2 and WO₃ nanowires.