

Yttrium Doping of Perovskite Oxide $\text{La}_2\text{Ti}_2\text{O}_7$ Nanosheets for Enhanced Proton Conduction and Gas Sensing Under High Humidity Levels

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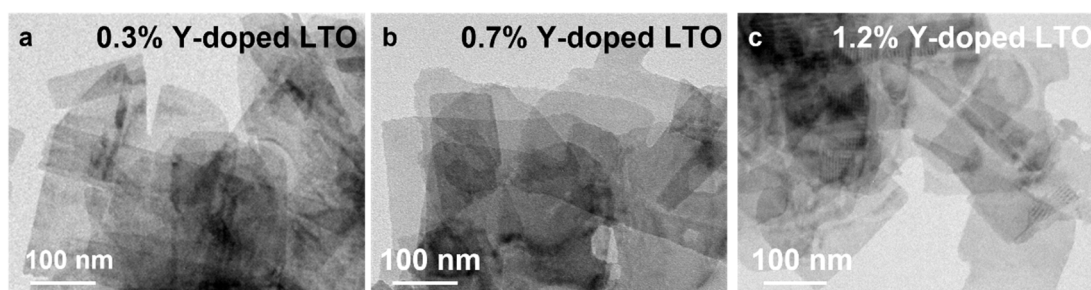


Figure S1. TEM images of (a) 0.3%, (b) 0.7% and (c) 1.2% Y-doped LTO nanosheets.

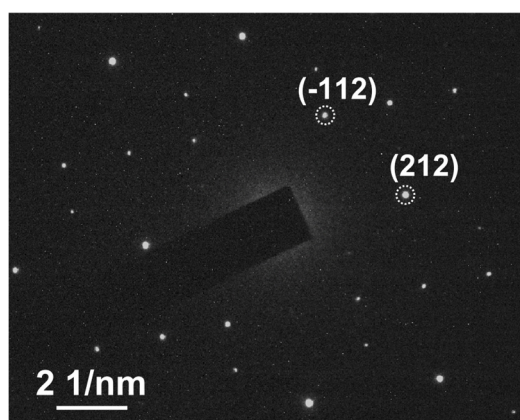


Figure S2. SAED pattern of 0.7% Y-doped LTO nanosheet.

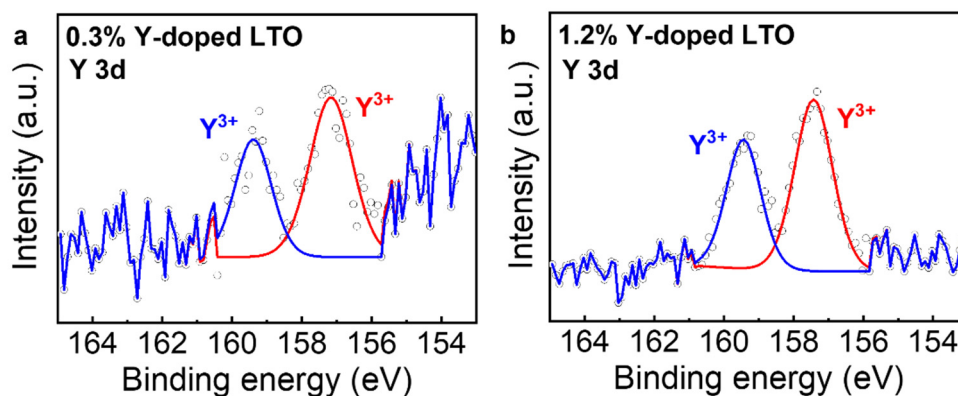


Figure S3. High-resolution Y 3d spectra of (a) 0.3% and (b) 1.2% Y-doped LTO nanosheets.

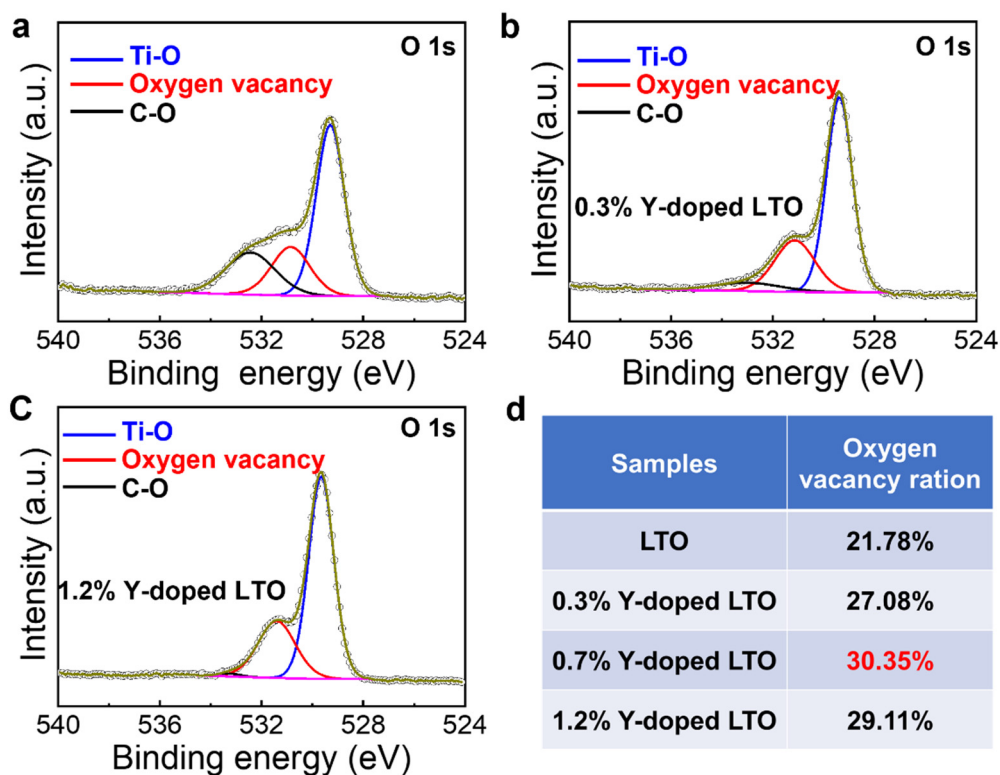


Figure S4. High-resolution O 1s spectra of (a) pure LTO, (b) 0.3% and (c) 1.2% Y-doped LTO nanosheets. (d) Oxygen vacancy ratio table of YLTO nanosheets.

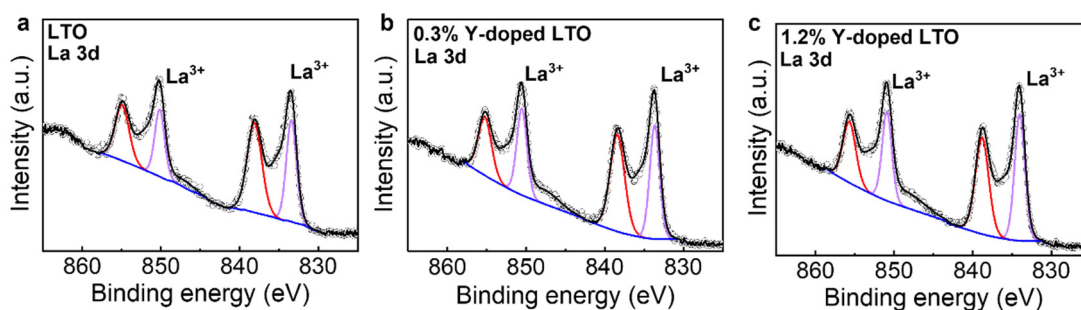


Figure S5. High-resolution La 3d spectra of (a) pure LTO, (b) 0.3% and (c) 1.2% Y-doped LTO nanosheets.

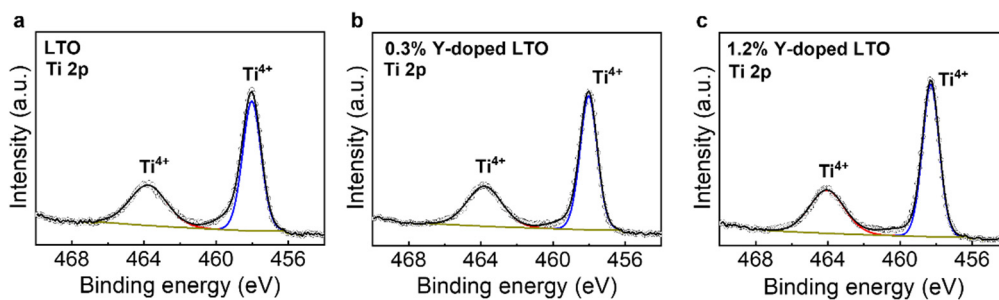


Figure S6. High-resolution Ti 2p spectra of (a) pure LTO, (b) 0.3% and (c) 1.2% Y-doped LTO nanosheets.

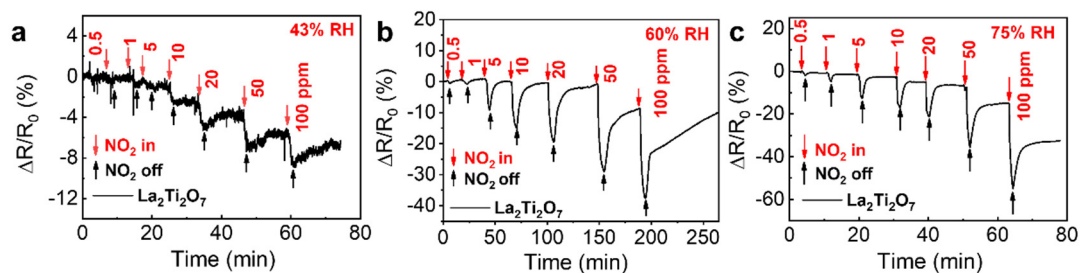


Figure S7. Sensing responses of LTO nanosheets to NO_2 under (a) 43% RH, (b) 60% RH and (c) 75% RH.

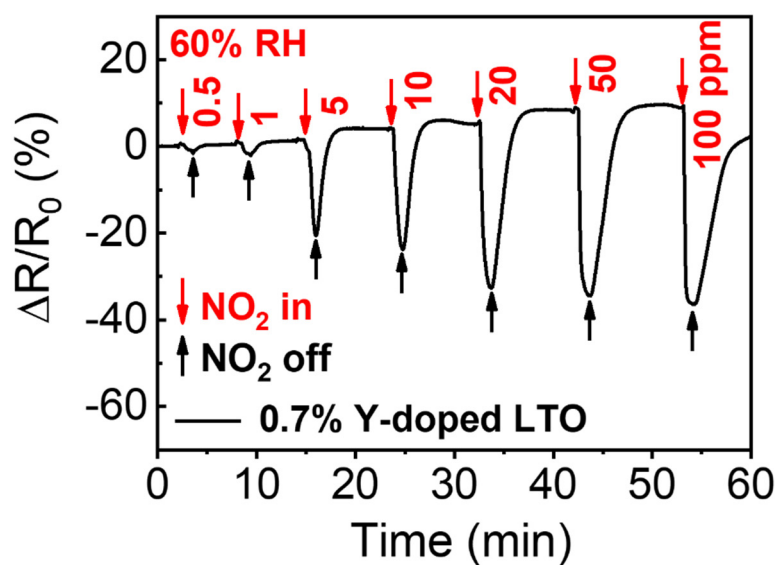


Figure S8. Sensing responses of 0.7% Y-doped LTO nanosheets to NO_2 under 60% RH.

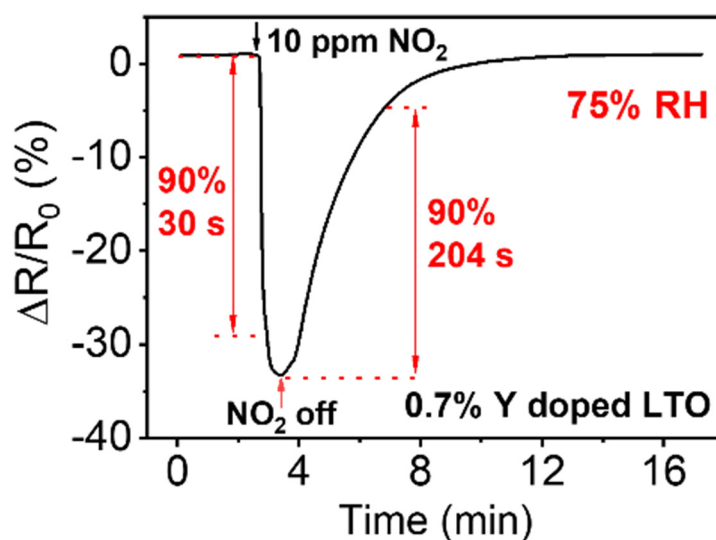


Figure S9. Dynamic response-recovery curves of 0.7% Y doped LTO to 10 ppm NO_2 at 75% RH.

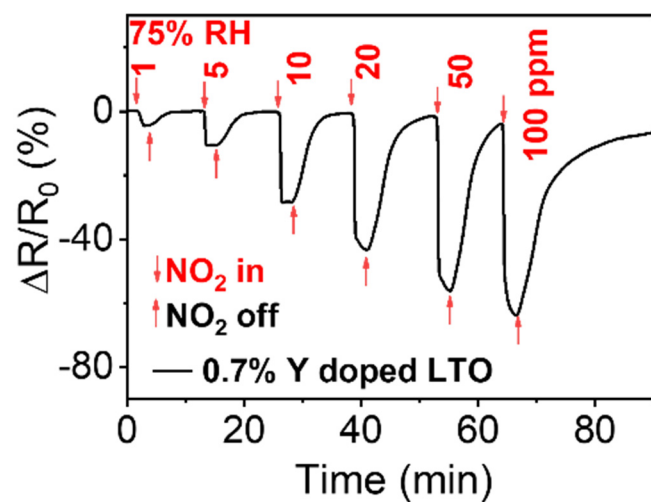


Figure S10. Dynamic response-recovery curves of 0.7% Y doped LTO after one week standing.

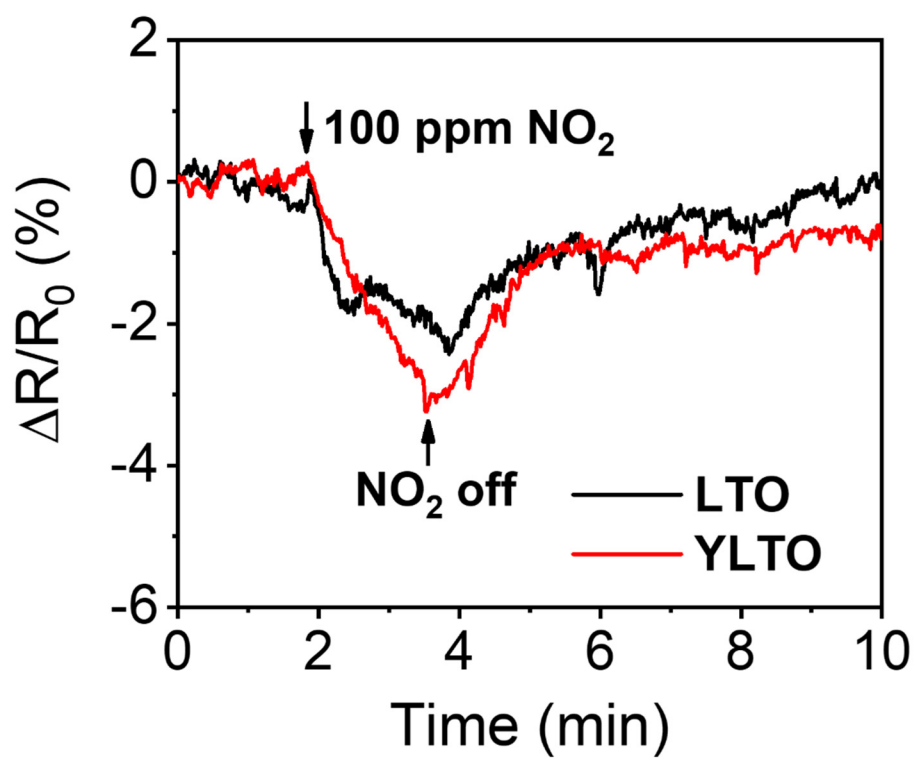


Figure S11. Sensing responses of LTO and 0.7% Y-doped LTO nanosheets to 100 ppm NO_2 under 23 % RH.

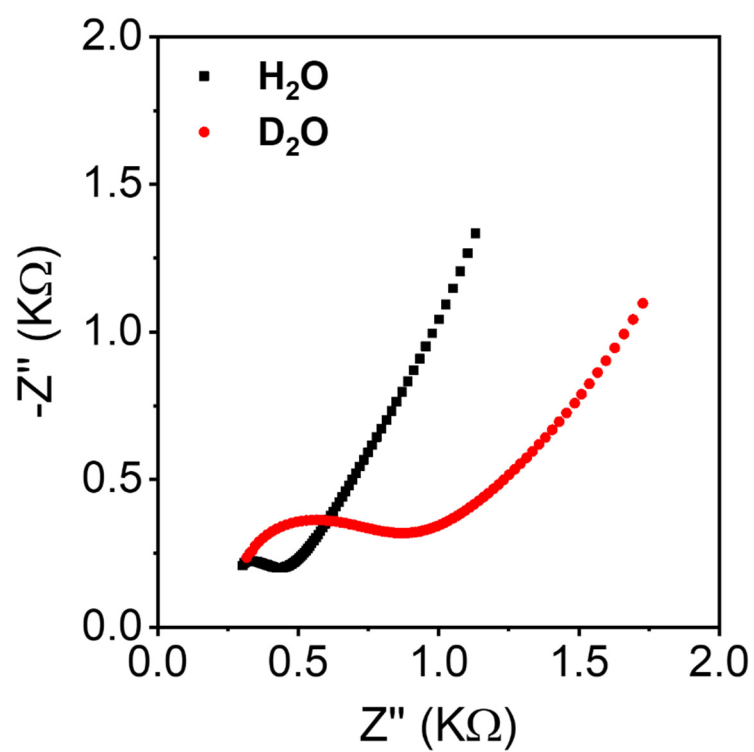


Figure S12. Nyquist plot of LTO nanosheet in H₂O and D₂O environments under 100% RH.

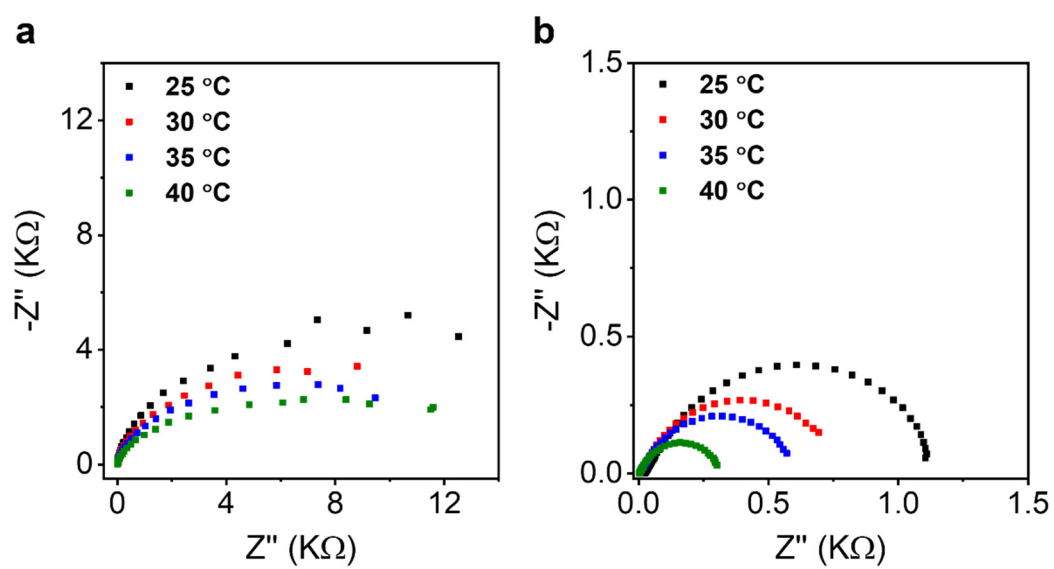


Figure S13. Nyquist plots of 0.7% Y-doped LTO nanosheets under (a) 43% RH and (b) 75% RH.

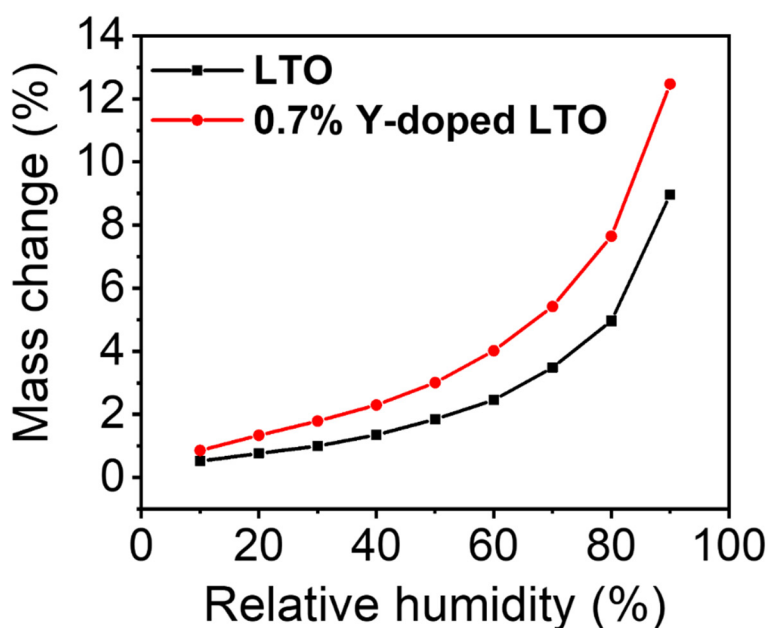


Figure S14. Water adsorption curves of LTO and 0.7% Y-doped LTO nanosheets.

Table S1. Comparison of the sensing performance of the recently reported NO₂ sensors based single-component metal oxides.

Material	Humidity Tolerance	Response	Response/Recovery Time	Detection Limit (ppm)	Ref.
YLTO	43% -75% RH	36% @ 10 ppm	30 s/204 s @ 10 ppm	0.5	This work
CuO	30% - 70% RH	33.3% @ 20 ppm	8 s/176 s @ 10 ppm	1	[1]
Ce ₂ Sn ₂ O ₇	70% - 85% RH	53% @ 50 ppm	4 s/52 s @ 10 ppm	0.5	[2]
WO ₃	Decreased response under high RH	45% @ 50 ppm, 250 °C	75 s/33 s @ 50 ppm	1	[3]
WO ₃	Unstable response under high RH	20% @ 3 ppm	50 s/300 s @ 3 ppm	3	[4]
In ₂ O ₃	~ 40% RH	35% @ 5 ppm, 400 °C	5 min/30 min @ 5 ppm	0.2	[5]
ZnO	Decreased response under high RH	43.7% @ 10 ppm, 300 °C	80 s/65 s @ 10 ppm	2	[6]
ZnO	/	36.4% @ 100 ppm, 200 °C	25 s/320 s @ 100 ppm	4	[7]

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