Supporting Information

Rapid and Stable Detection of Carbon Monoxide in Changing Humidity Atmospheres Using Clustered In_2O_3/CuO Nanospheres

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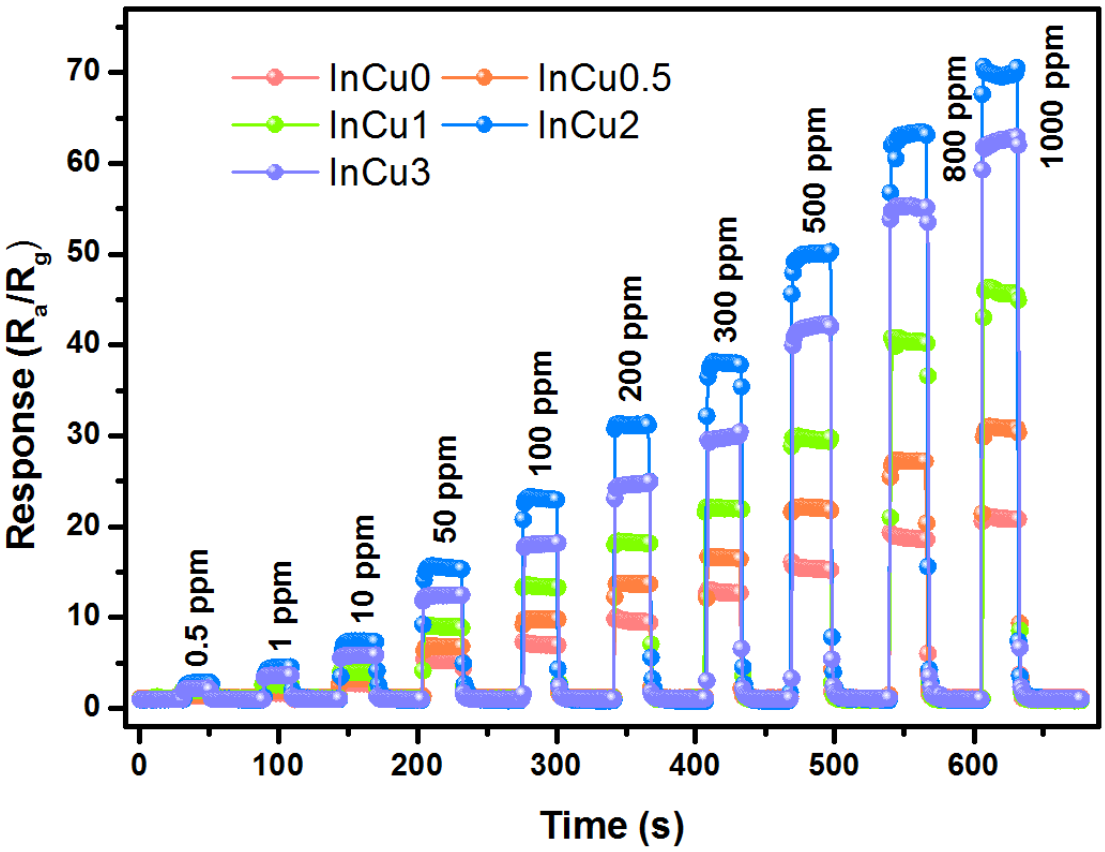

Figure S1. Dynamic response of all the sensors upon exposure to different concentration of CO.

Figure S1 presents the real-time dynamic response curves of all the sensors upon exposure to different concentration of CO at 200℃. As the same as the resistance change curves, all gas sensors exhibited quick responses and recovery to CO. The response of all the sensors remarkably increased when increasing the CO concentration. A significant increase in the sensor response at each concentration is clearly observed with the addition of CuO, especially for InCu2, which is consistent with the data shown in Figure 4a. Besides, the limit of detection (LOD) for CO of the In_2O_3 sensors can down to 0.5 ppm. And InCu2 displays a high response of 2.83 to 0.5 ppm CO.

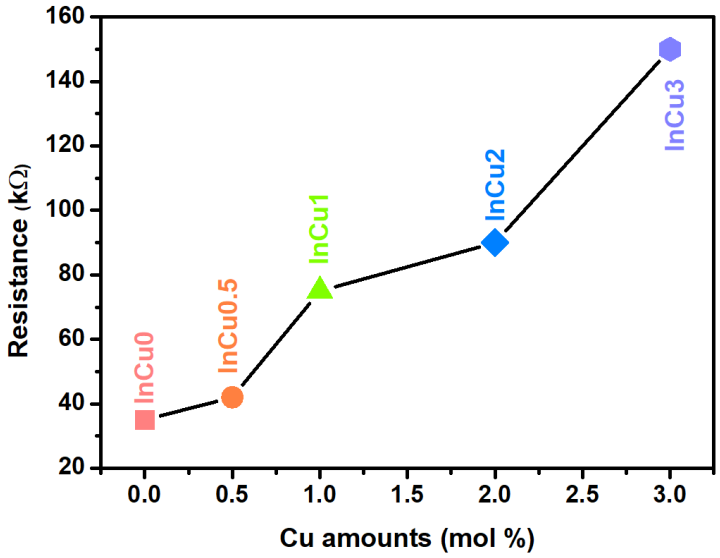

Figure S2. Electric resistance in air versus Cu amount under optimal working temperature of 200℃.

Figure S2 displays the electric resistance value of each gas sensor in air at their optimal working temperature of 200℃, respectively. It is clearly that the electric resistances increase with the raise of Cu amount, indicating higher resistance value of In_2O_3 contain p-h junction. This result is similar with previous works [1, 2].

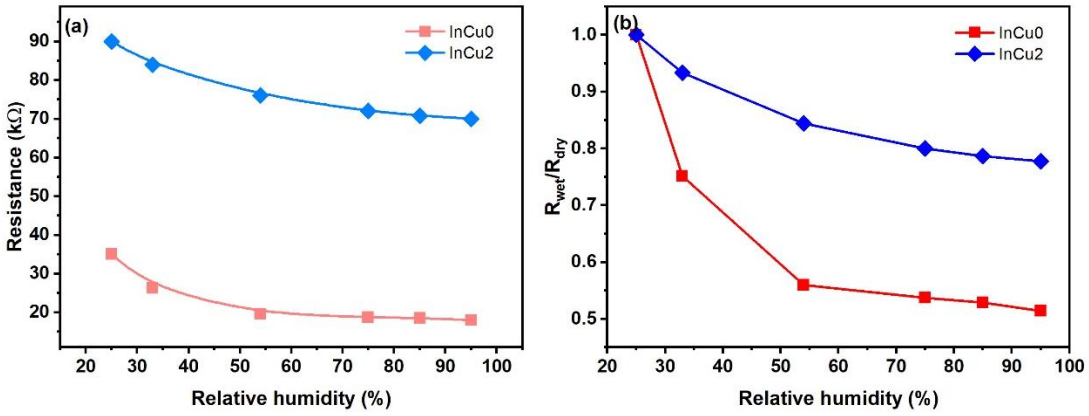

Figure S3. (a) Electric resistance in air versus relative humidity under optimal working temperature of 200℃; (b) the corresponding R_{wet}/R_{dry} values of InCu0 and InCu2.

Figure S3a exhibits the electric resistance value of InCu0 and InCu2 based gas sensors in air under different relative humidity at 200℃, respectively. The electric resistance of both sensors was reduced dramatically in the low concentration of water vapor. However, the change tended to become small with the raise of the relative

humidity, which is similar with our earlier research [3]. Further, the electric resistances of InCu2 were 2.5 and 3.9 times higher than those of InCu0 in wet atmosphere of 25% RH and 95% RH, respectively. The ratios of the sensor resistances in air (R_{wet}/R_{dry}) under different degree of wet and relative dry atmosphere were calculated to quantify the effect of humidity on the chemiresistive sensing behaviors of the InCu0 and InCu2 (Figure S3b). Sensor with $R_{wet}/R_{dry}=1$ shows the humidity-independent response. The lower the value of R_{wet}/R_{dry}, the greater the effect of moisture on the resistance. Evidently, the R_{wet}/R_{dry} of InCu2 is higher than that of InCu0 under 33% RH, 54% RH, 75% RH, 85% RH and 95% RH, which suggests that the reduction of electric resistance in wet atmosphere is suppressed by loading CuO.

References

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