Supporting Information

Tuning electrical conductivity of amorphous carbon-reduced graphene oxide wrapped-Co$_3$O$_4$ ternary nanofibers for highly-sensitive chemical sensors

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**Figure S1.** Morphologies of the final samples of S1 (a), S2 (b), S3 (c), S4(d), S5(e) and (f) carbon layer on some part of Co$_3$O$_4$ crystal surfaces of S6.

**Figure S2.** The TGA of precursor nanofibers of (a) pure PVP, (b) PVP + cobalt salts under nitrogen and (c) rGO and amorphous carbon under air and the DSC of (d) rGO and amorphous carbon under air.
**Figure S3.** Correlation between the average crystal size of $\text{Co}_3\text{O}_4$ and the thermal etching time.

![Graph showing correlation between thermal etching time and average grain diameter.](image)
Figure S4. (a-g) Peak fittings for C 1s pattern and (h-n) Peak fittings for O 1s pattern of samples

Figure S5. The I-V polarization curves of (a) S0-S6, (b) the calculation of resistance with different thermal etching time, (c) S2-S3 and (d) S4-S6.
Figure S6. The response of the S4 based sensor to NH$_3$ of 50 ppm in (a) dry air and (b) humid air with the varied relative humidity at room temperature.

Figure S7. The in-situ FTIR patterns of S4 within the wavenumber range from 800 to 4000 cm$^{-1}$. 
Figure S8. The stabilization process of the resistance of sensor without rGO before sensing measurement.

Figure S9. Response of the sensor based on rGO to NH$_3$ of 50 ppm at room temperature.
Figure S10. (a) Response to NH$_3$ of 1-100 ppm, the repeatability of response to NH$_3$ of 50 ppm and recovery with pulse heating for 6 s and (b) magnification of test for 50 ppm (the last time) in (a).

Figure S11. The photographs of S0, S1, S2, S3, S4, S5 and S6.