Supporting Information

Chemically Fluorinated Graphene Oxide for Room Temperature Ammonia Detection Capability at ppb Levels

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Table S1. The content of fluorine and ratio of C/F in this work and the previous works.

Synthetic method	Fluorine content (atomic %)	C/F ratio	Reference
Facile solution process	25.21 (Carbon: 60.10, Oxygen: 14.69)	$C_{2.38}F$	This work
Plasma treatment	24.6	$C_{3.1}F$	1
Hydrothermal method	-	$C_{2.1}F$	2
Gas exposure	4.94 – 34.36	$C_{11.49\text{-}1.56}F$	3
Improved hummer's method	23.00	$C_{2.81}F$	4
Annealing with gas exposure	33.41 – 48.11	$C_{1.65\text{-}0.98}F$	5

Table S2. The content of carbon and oxygen in CFGO, rGO and GO.

Product	Carbon and oxygen content (atomic %)	C/O ratio
CFGO	Carbon: 60.10, Oxygen: 14.69 (Fluorine: 25.21)	$C_{4.09}O$
rGO	Carbon: 86.86, Oxygen: 13.14	$C_{6.61}O$
GO	Carbon: 70.33, Oxygen: 29.67	$C_{2.37}O$

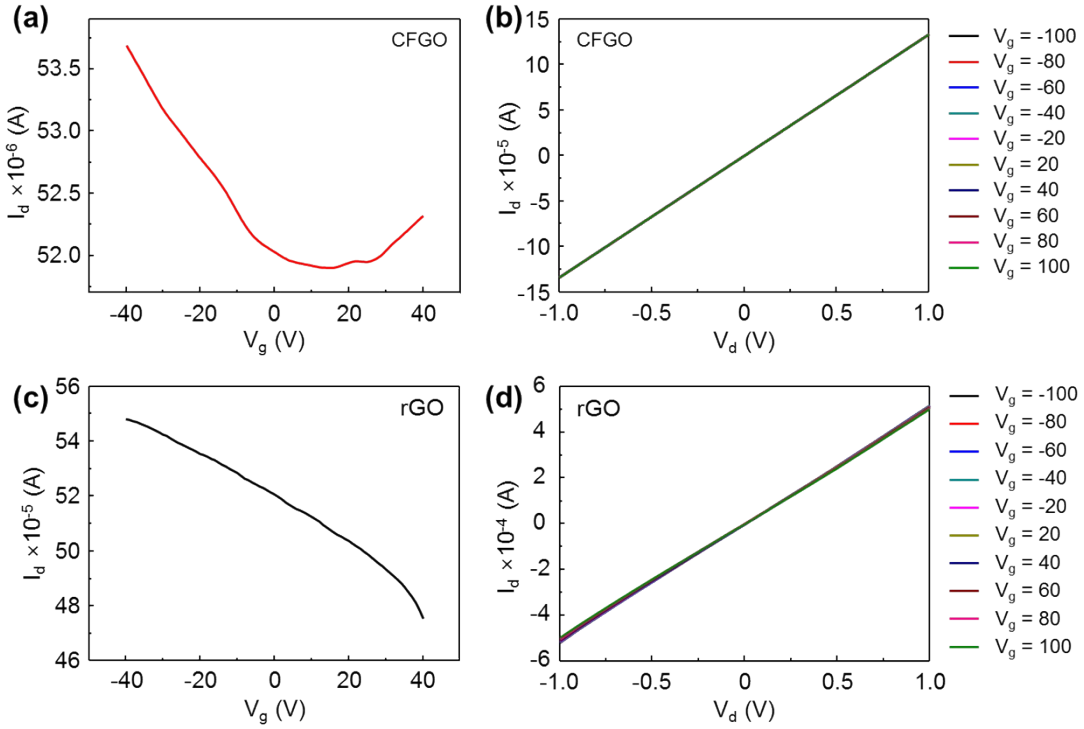

Fig. S1 Transfer and output characteristics of (a-b) CFGO and (c-d) rGO FETs.

FET characterization

The channel length and width of the fabricated FETs were 100 and 2000 μm, respectively. Current-voltage characteristics of all devices were measured using a Keithley 4200-SCS and a probe station operated under air condition. After deposition of source and drain electrodes, each device was isolated by a mechanical scratch. In order to collect transfer characteristics, the gate voltage was swept from V_g = 40 V to V_g = −40 V in increments of −1 V, while the source-drain voltage was kept unchanged at V_d = −0.1 and 1 V for CFGO and rGO devices, respectively.

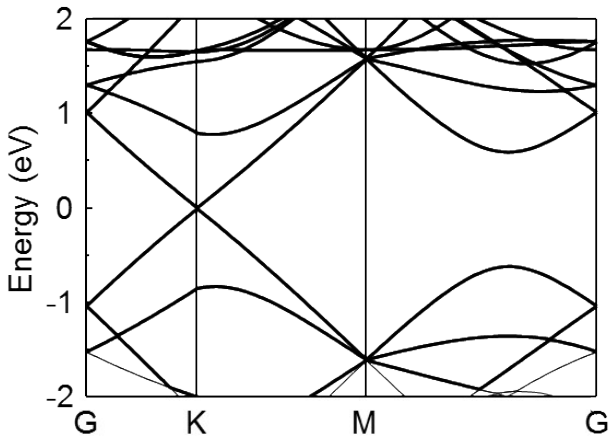

Fig. S2 Electronic band structure of graphene.

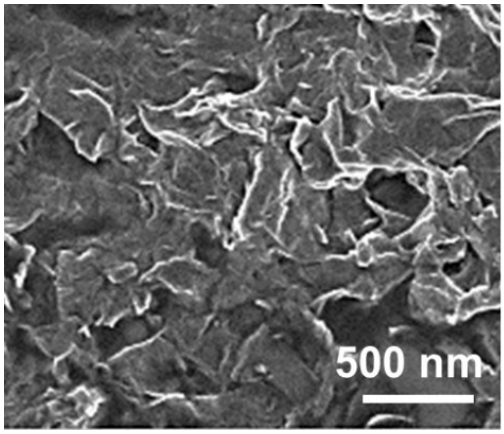

Fig. S3 SEM image of a rGO film.

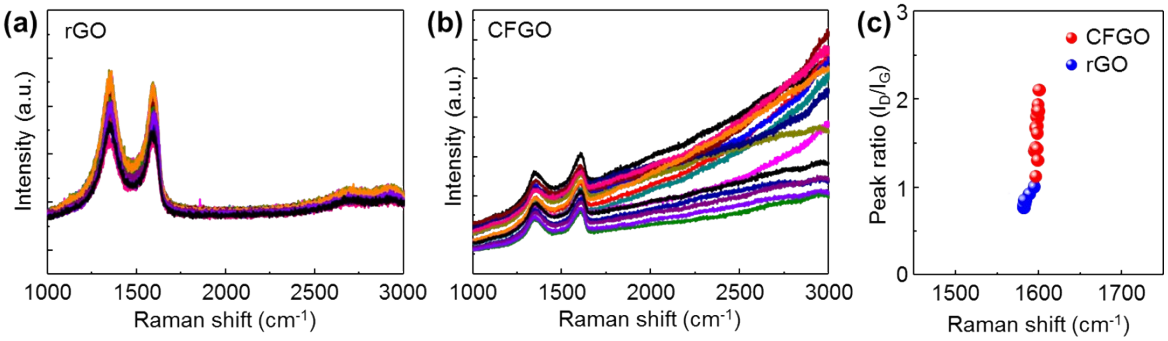

Fig. S4 Raman spectra of (a) rGO and (b) CFGO films for fifteen different spots on SiO_2 substrates. (c) Intensity ratio I_D/I_G of CFGO (red) and rGO (blue) film.

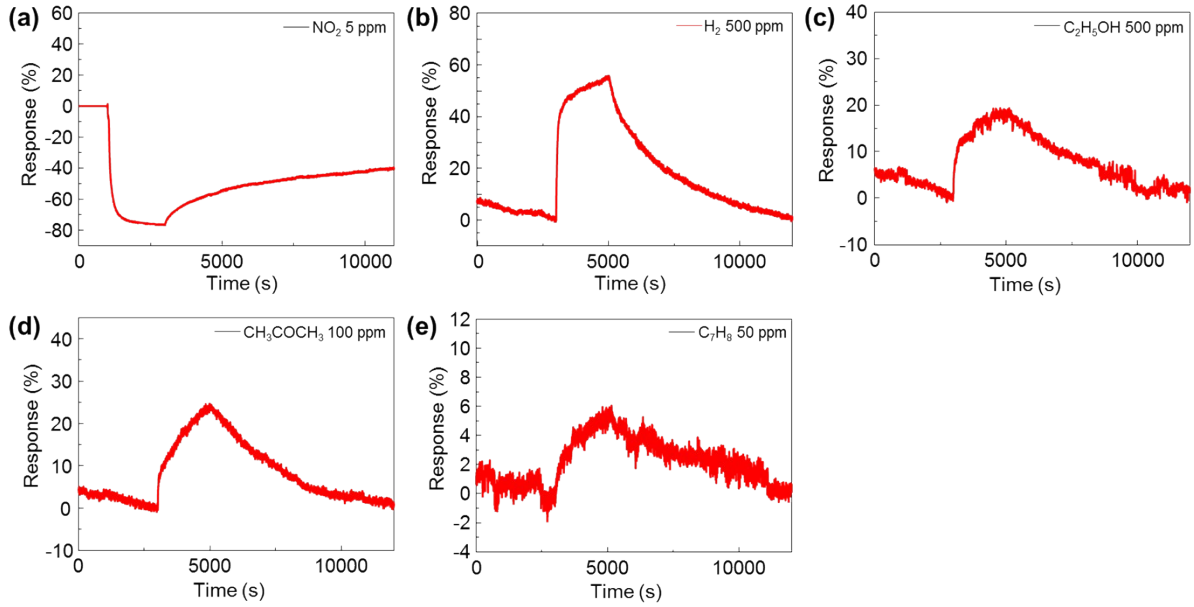

Fig. S5 Response curves of the CFGO sensor to (a) 5ppm NO_2, (b) 500 ppm H_2, 500 ppm C_2H_5OH, 100 ppm CH_3COCH_3 and 50 ppm C_7H_8.

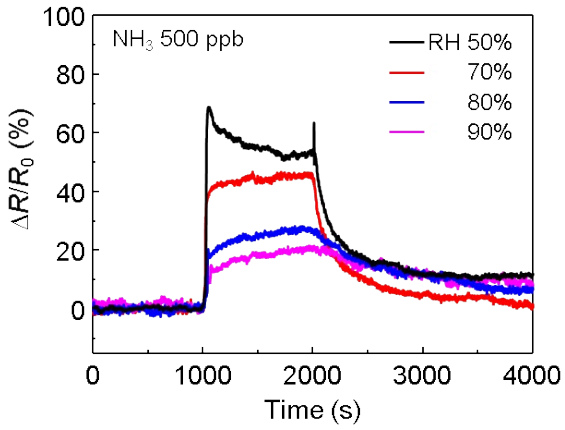

Fig. S6 Response curves of the CFGO sensor to NH_3 500 ppb in 50 to 90 % of relative humidity (RH) atmosphere.

References

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