

Supporting information

Highly stretchable, mechanically stable, and weavable reduced graphene oxide yarn with high NO₂ sensitivity for wearable gas sensors

Yong Ju Yun,^a Do Yeob Kim,^b Won G. Hong,^c Dong Han Ha,^d Yongseok Jun^a and Hyung-Kun Lee^{*b,e}

^aDepartment of Energy Engineering, Konkuk University, Seoul, 05029, Republic of Korea

^bICT Materials & Components Research Laboratory, Electronics and Telecommunications Research Institute (ETRI), Daejeon, 34129, Republic of Korea

^cDivision of Electron Microscopy Research, Korea Basic Science Institute (KBSI), Daejeon, 34133, Republic of Korea

^dQuantum Technology Institute, Korea Research Institute of Standards and Science (KRISS), Daejeon, 34113, Republic of Korea

^eDepartment of Advanced Device Technology, University of Science & Technology, Daejeon, 34113, Republic of Korea

*Corresponding e-mail address: hkleee@etri.re.kr

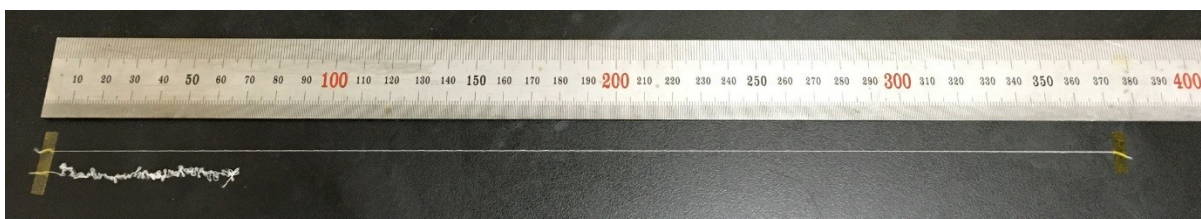


Fig. S1. A photograph of pristine polyester-spandex core-spun elastic yarn.

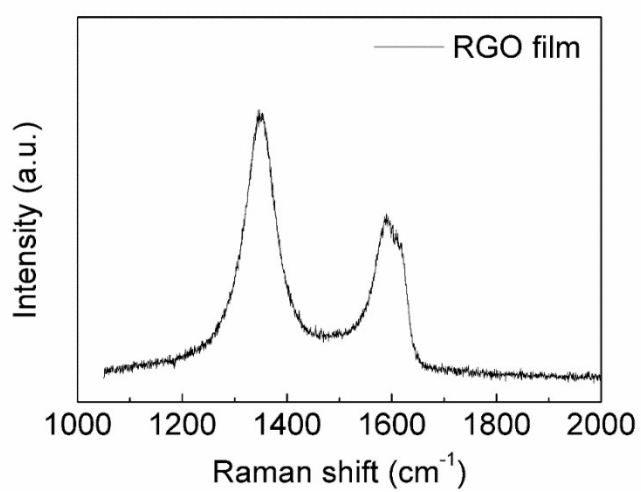


Fig. S2. A Raman spectrum of RGO film.

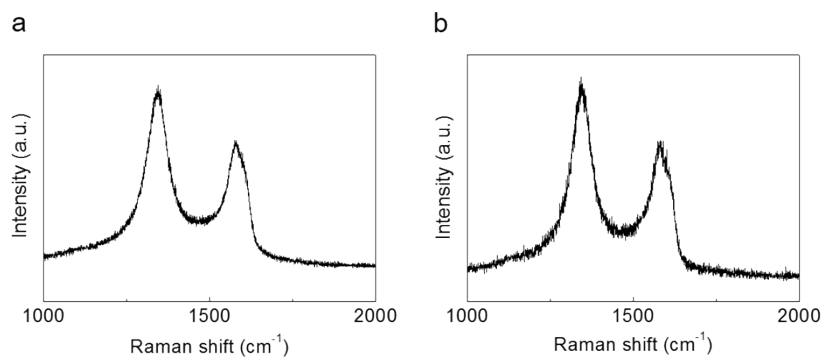
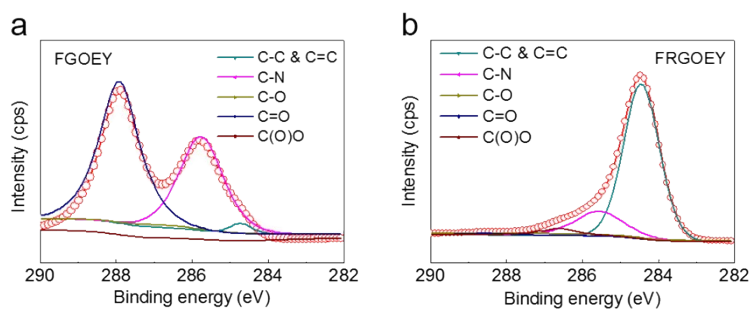


Fig. S3. Raman spectra of various areas of a single FRGOEY.



		C=C & C-C	C-N	C-O	C=O	C(O)O
FGOEY	position	284.6	285.81	286.66	287.65	288.56
	Area	166690.2	19583.68	70253.59	24130.49	15193.2
	Area %	56.3	6.6	23.7	8.2	5.2
FRGOEY	position	284.6	285.75	286.48	287.53	288.53
	Area	251932.5	27970.78	43496.92	15005.67	10977.32
	Area %	72.2	8.0	12.4	4.3	3.1

Fig. S4. High-resolution XPS C 1s spectra of FGOEY and FRGOEY.

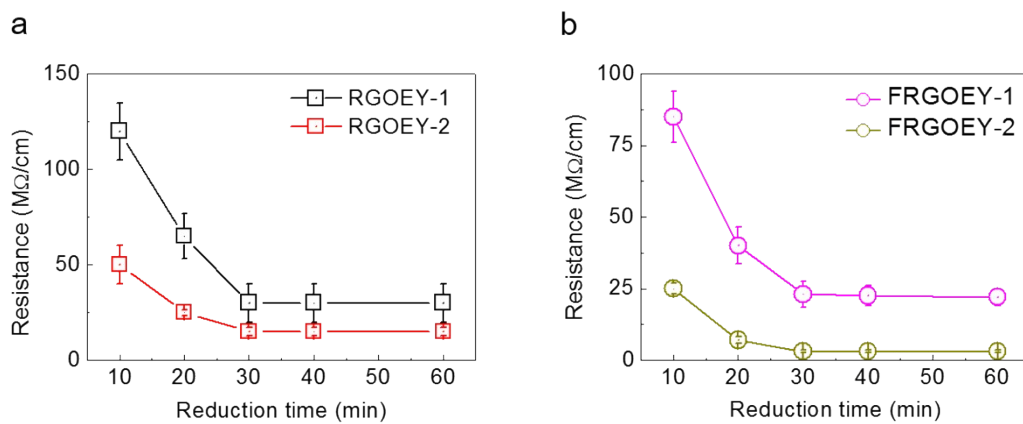


Fig. S5. Resistance variations of RGOEYs and FRGOEYs as a function of reduction time.

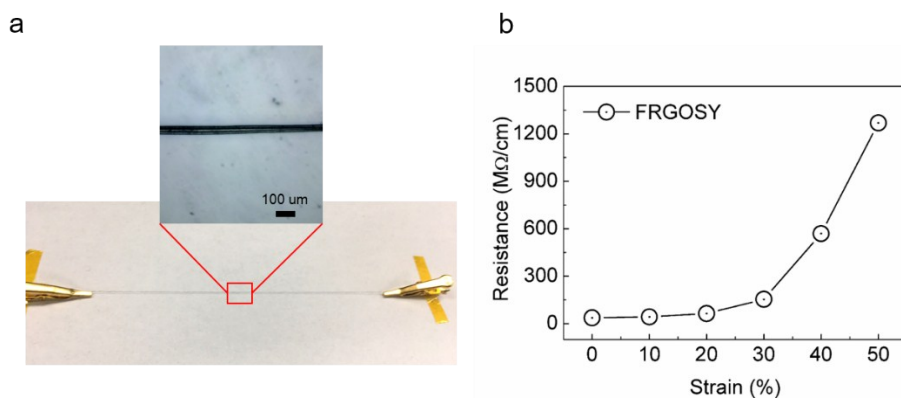


Fig. S6. (a) A photograph of the FRGOSY. Inset: an enlarged photograph of Fig. S4a. (b) Relative variations in resistance versus strains for the FRGOSY.

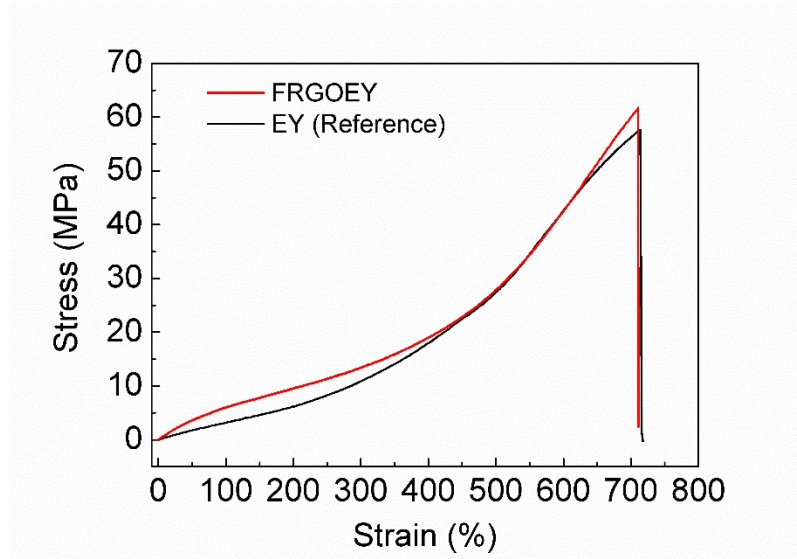
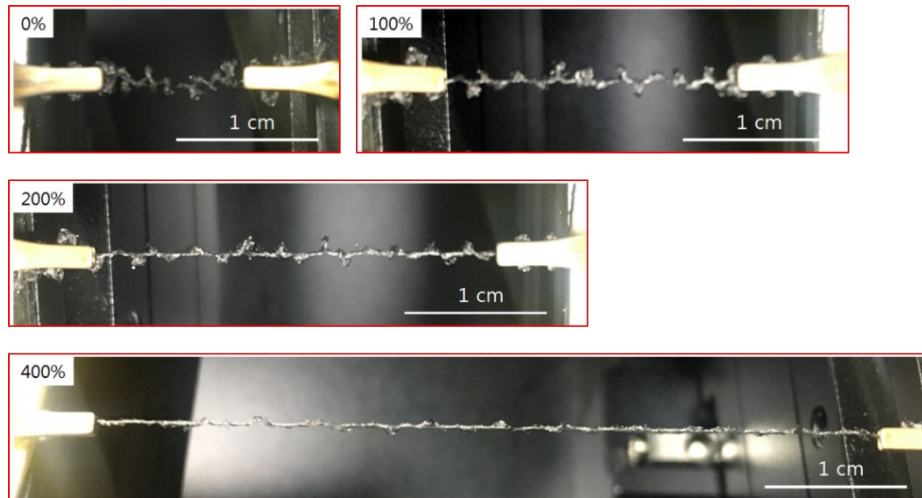


Fig. S7. Tensile stress-strain curves for FRGOEY and EY.



Strain (%)	Radius of curvature of FRGOEY
0%	2.0 ± 1.0 mm
100%	1.0 ± 0.3 mm
200%	0.45 ± 0.05 mm
400%	∞

Fig. S8. Photographs of FRGOEY during stretching test.

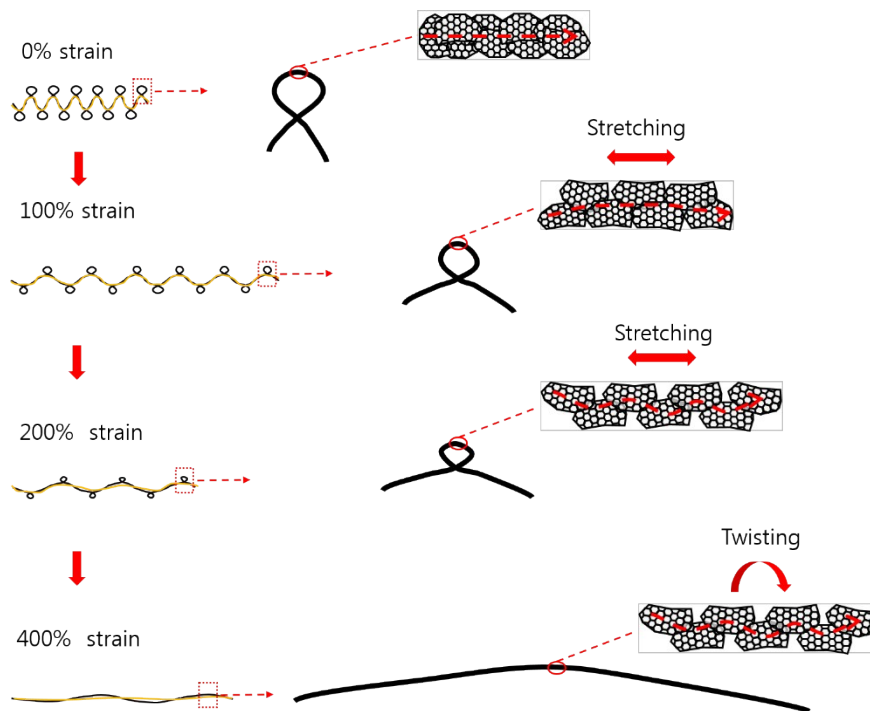


Fig. S9. Schematic illustration of the FRGOEY under 0, 100%, 200%, and 400% strains.

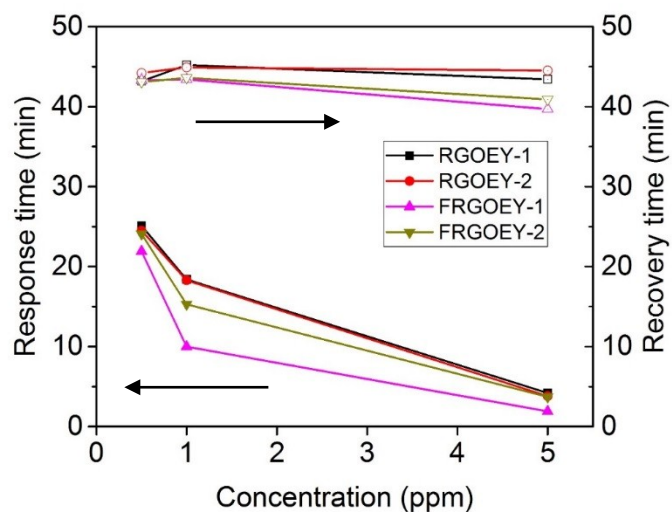


Figure S10. Recovery and response time of all samples as a function of NO_2 concentrations.

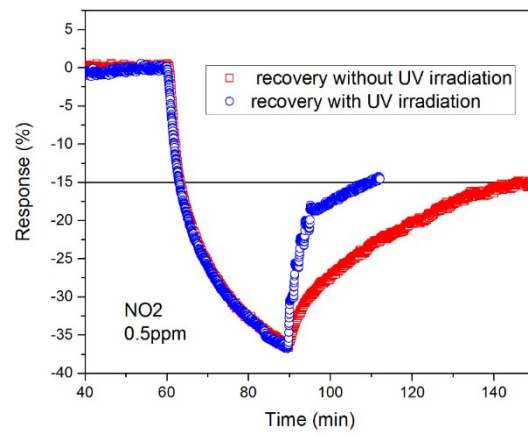


Fig. S11. UV irradiation for fast recovery at 57% RH.

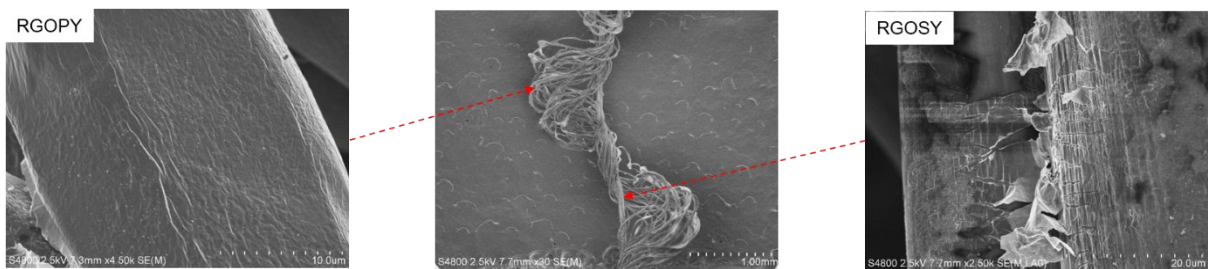


Fig. S12. FESEM images of FRGOEY.

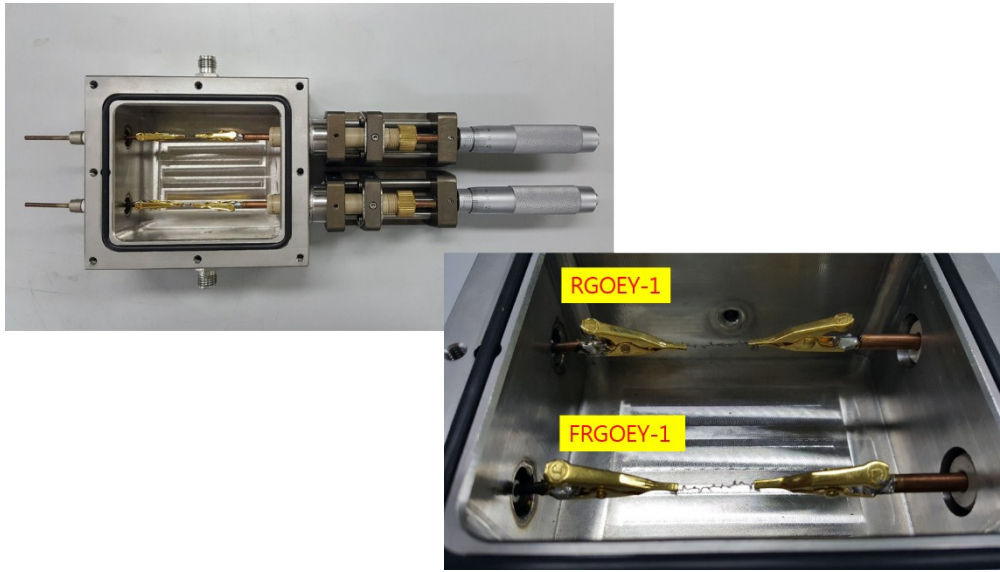


Fig. S13. Photographs of RGOEY-1 and FRGOEY-1.

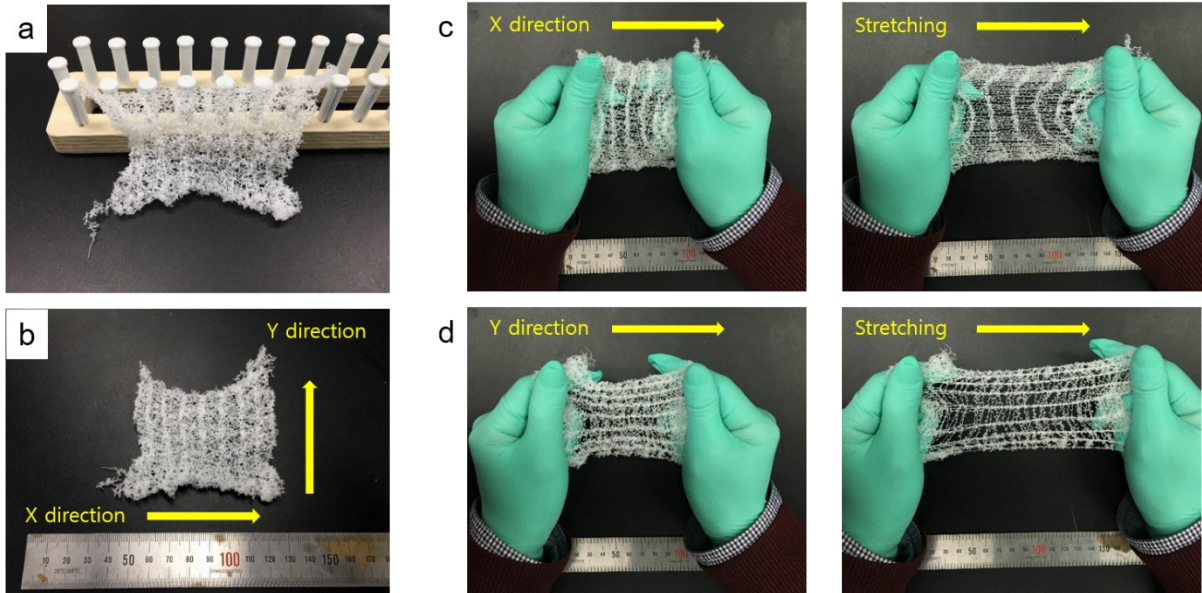


Fig. S14. Photographs of knitted fabrics as a wrist-band.