

Role of Oxygen Functional Groups and Attachment of Au Nanoparticles on Graphene Oxide Sheets For Improved Photodetection Performance

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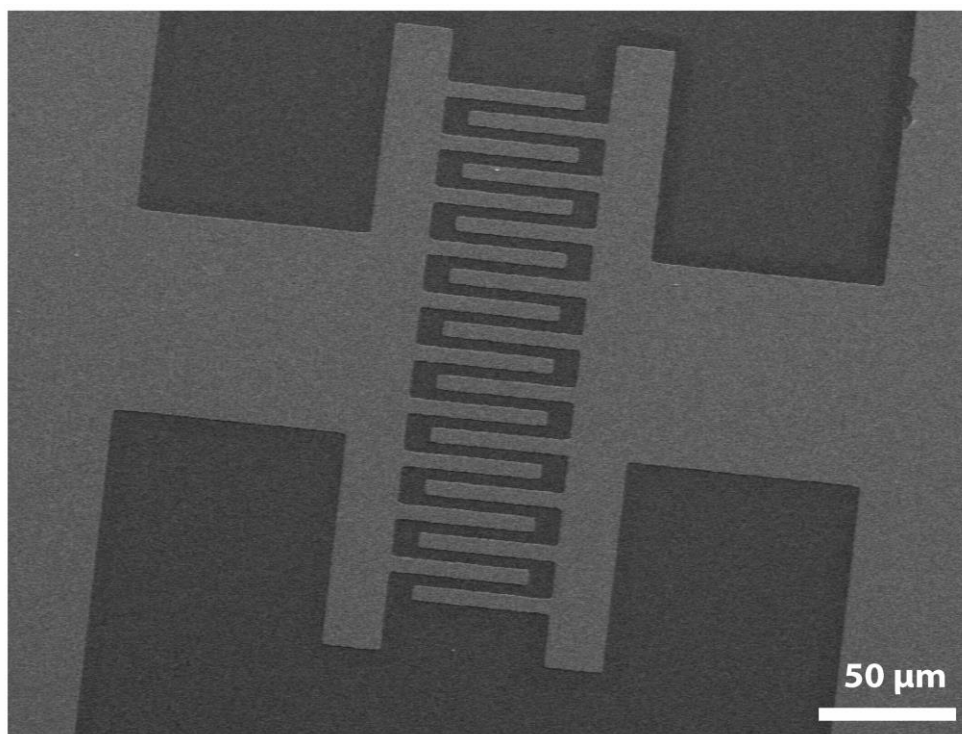


Fig. S1: Inter digitated electrode (IDE) patterned on the substrate.

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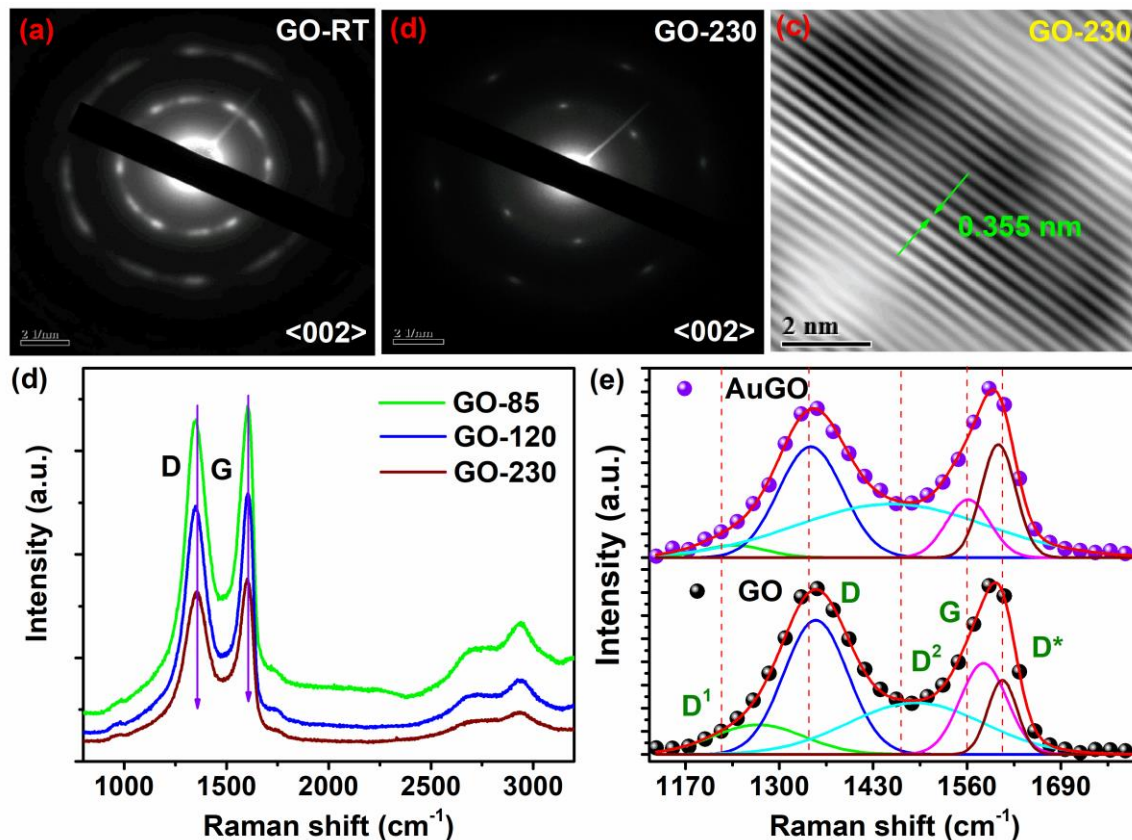


Fig. S2: SAED pattern for (a) GO-RT and (b) GO-230, (c) IFFT analysis of GO-230, (d) the Raman spectra of GO annealed at various temperatures, and (e) the deconvolution of the D and G bands by Gaussian peaks for GO-RT and AuGO.

Table S1: Deconvolution of the D and G band by five Gaussian peaks on both the GO and AuGO

Deconvoluted peaks	Peak position of GO (cm ⁻¹)	Peak positions of AuGO (cm ⁻¹)	Shift of peak positions from GO peak (cm ⁻¹)
D ¹	1257	1246	11
D	1350	1343	7
D ²	1488	1465	23
G	1582	1571	11
D*	1609	1603	6

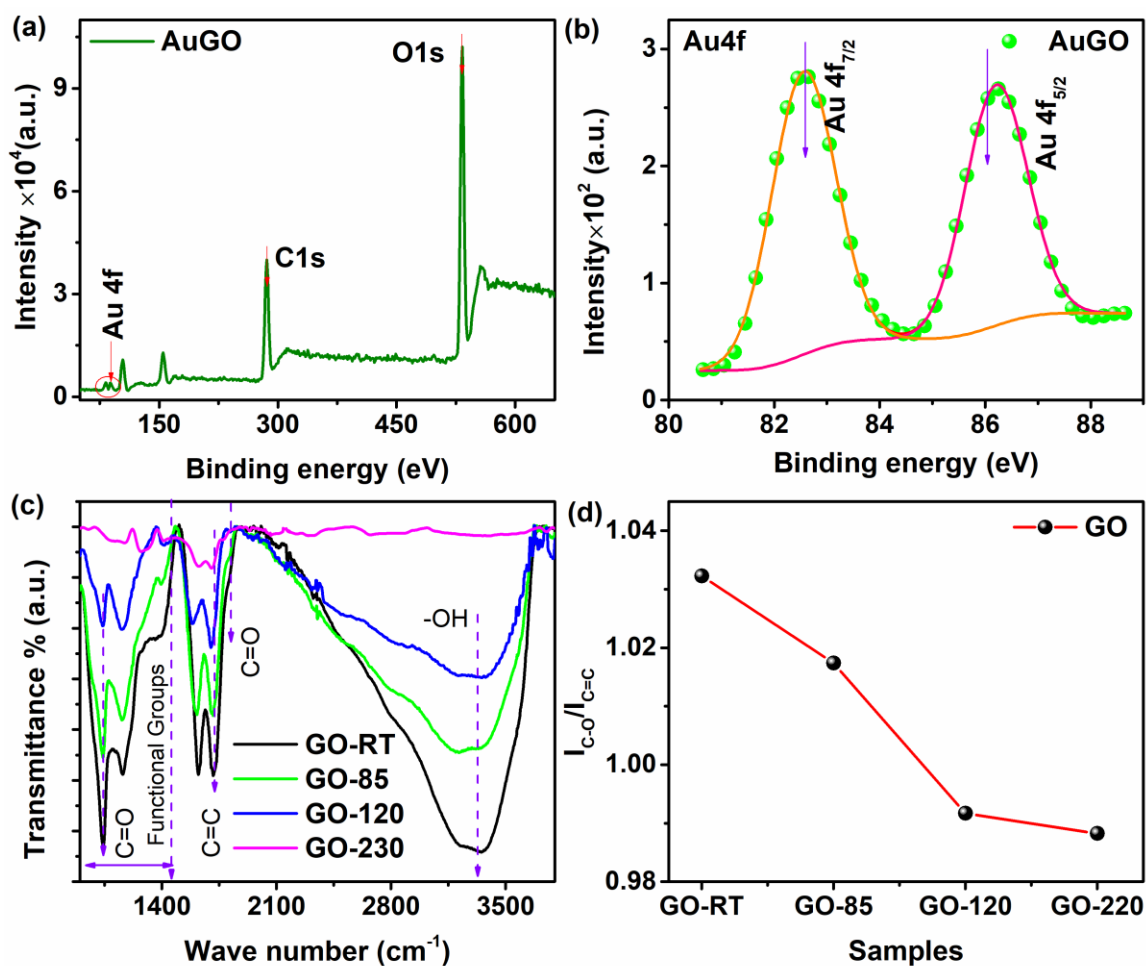


Fig. S3: (a) The survey spectrum of XPS analysis for AuGO, (b) deconvoluted XPS spectra for Au4f. (c) FTIR spectra of GO before and after annealing, and (d) the intensity ($I_{C=O}/I_{C=C}$) ratio C-O and C=C peak of GO samples annealed at different temperatures.

Table S2: Spectral weight of the different temperature annealed GO samples.

Samples	Annealing Temperature (°C)	Spectral weight (%)				
		C=C	C-C	C-O	C=O	O-C-O
GO-RT	RT	20.72	21.28	20.08	23.59	14.33
GO-85	85	39.8	20.69	13.98	14.27	11.26
GO-230	230	57.27	20.69	12.66	9.38	--

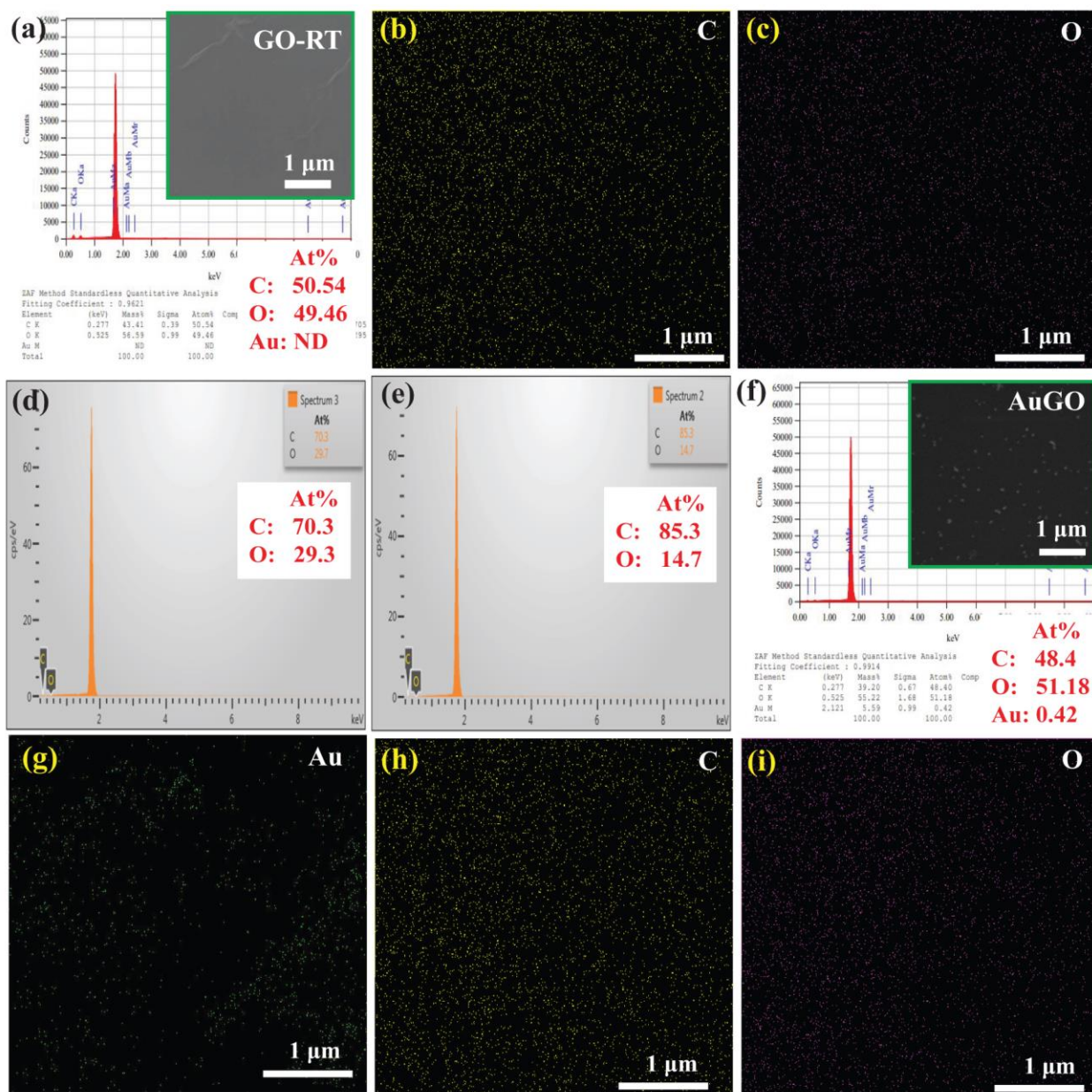


Fig. S4: (a) EDS analysis on GO-RT and performing elemental mapping for (b) C, and (c) O in GO-RT. Analyzing (d) GO-85, (e) GO-230, and (f) AuGO through EDS. The elemental mapping for (g) Au, (h) C, and (i) O in AuGO.

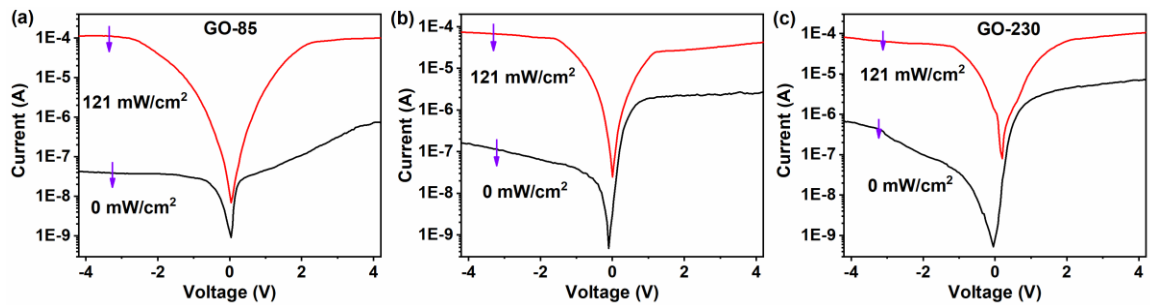


Fig. S5: Logarithmic I-V characteristics of (a) GO-85, (b) GO-120, and (c) GO-230 in dark and under light illumination.

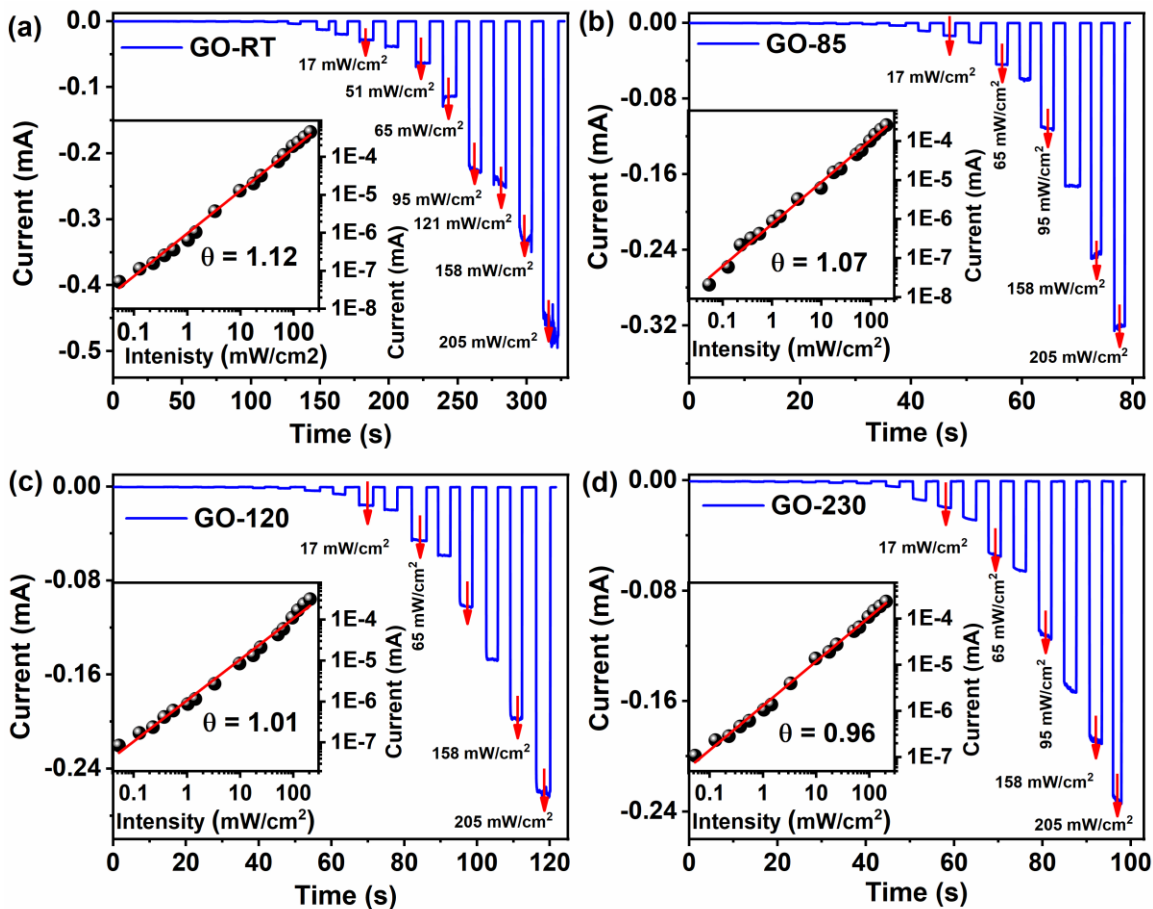


Fig. S6: Photocurrent response of the (a) GO-RT, (b) GO-85, (c) GO-120, and (d) GO-230 for different excitation powers. The inset in each case shows the logarithmic plot of photocurrent vs. light intensity (mW/cm²) to determine the slope (θ).

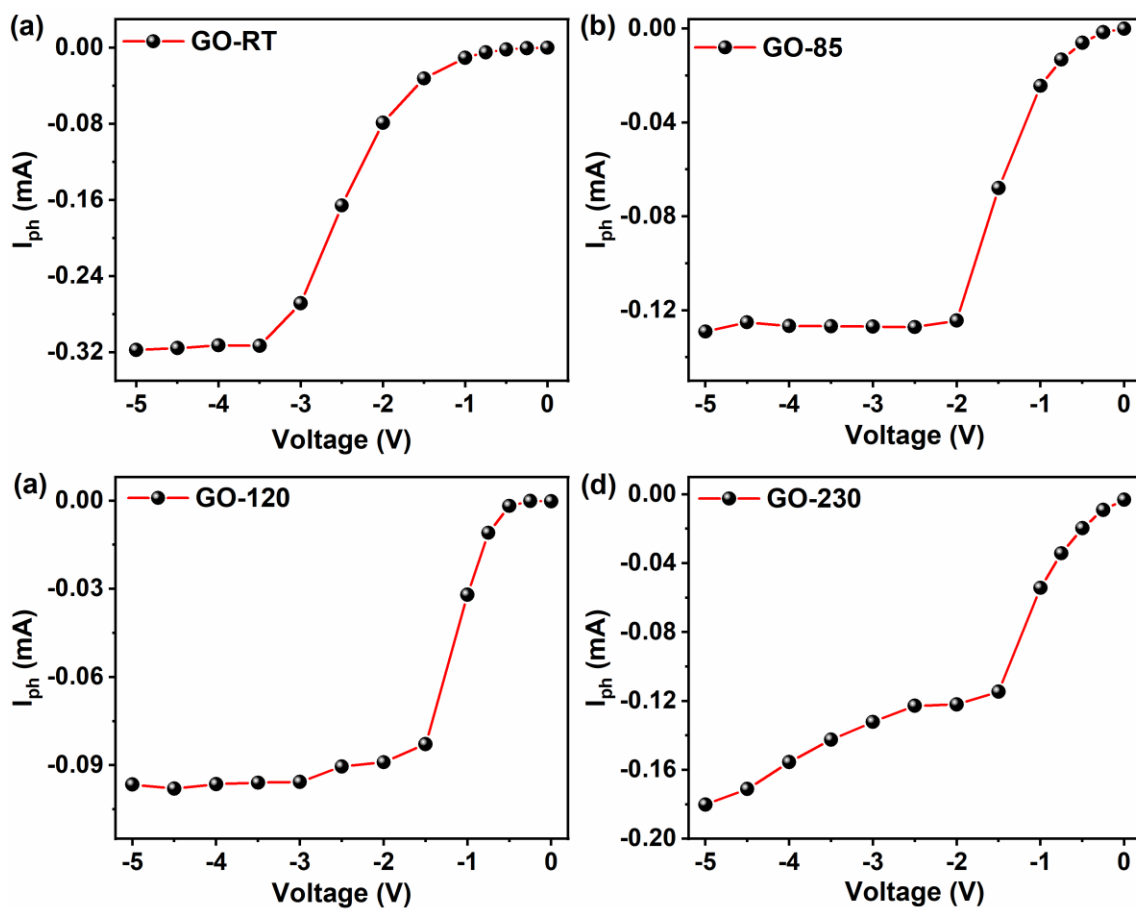


Fig. S7: Photocurrent (I_{ph}) as a function of bias voltage for (a) GO-RT, (b) GO-85, (c) GO-120, and (d) GO-230.

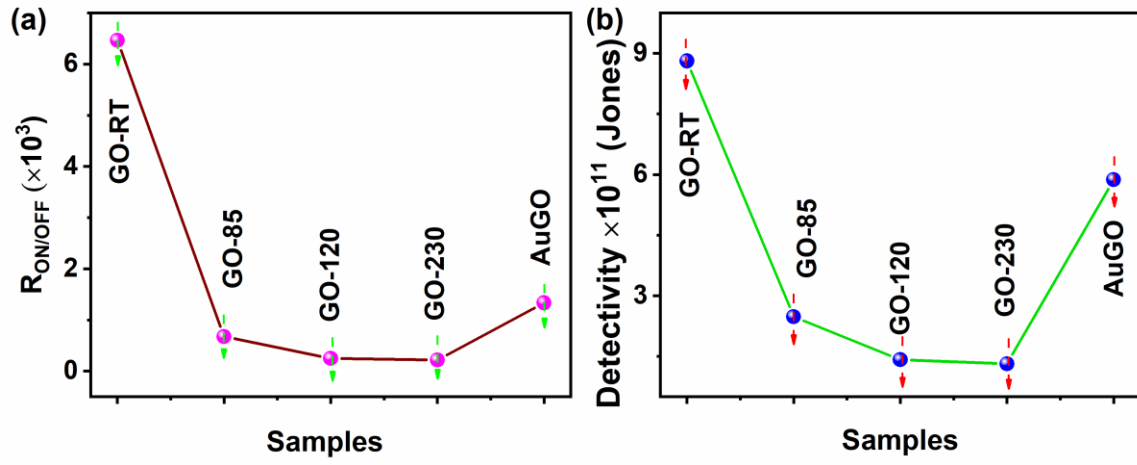


Fig. S8: A comparison of on/off current ratio ($R_{ON/OFF}$) and detectivity (D) for the GO-RT, GO-85, GO-120, GO-230, and AuGO.