

Supplementary Information

Magnetic carbon gate electrodes for the development of electrolyte-gated organic field effect transistor bio-sensing platforms

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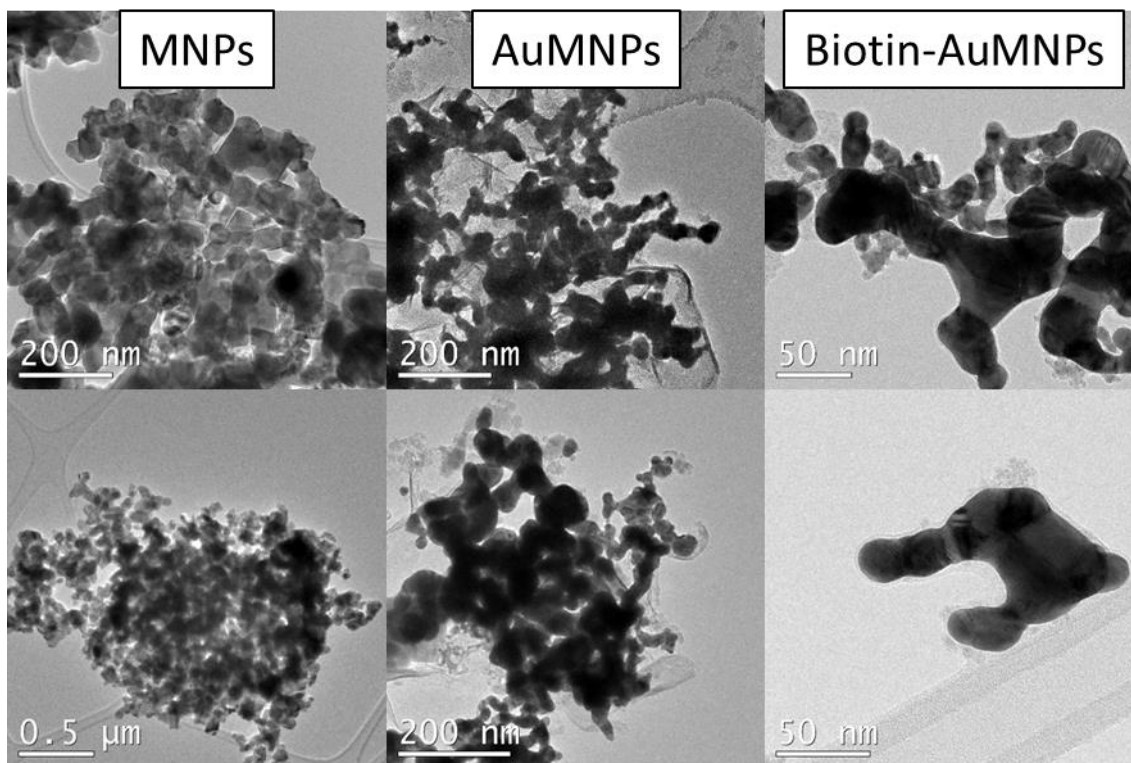


Figure S1. HR –TEM images of MNPs, AuMNPs and Biotin- AuMNPs.

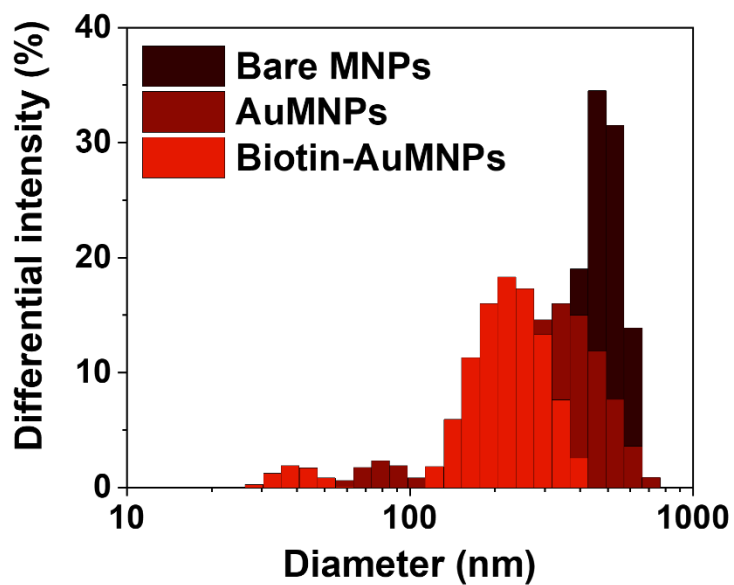
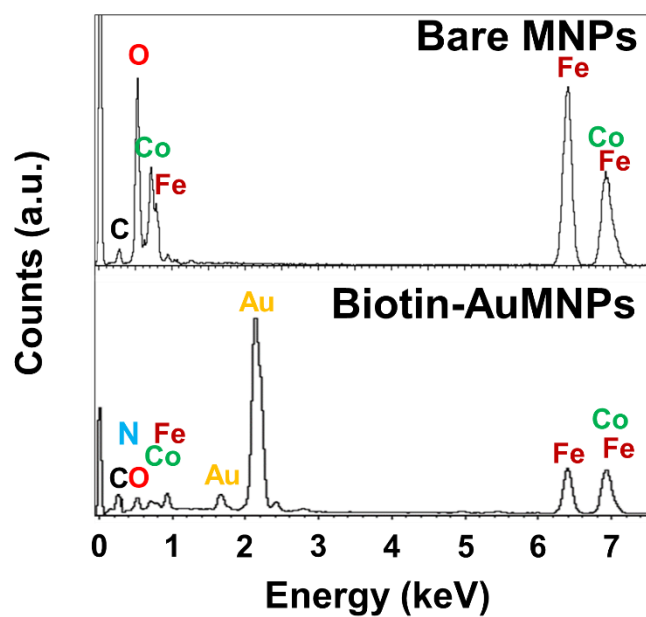


Figure S2. DLS measurements for hydrodynamic diameter of MNPs. The panel represents the results from three steps of the functionalization, each coloured differently.



Element	Bare MNPs		Biotin-AuMNPs	
	Peak (Area)	Atomic (%)	Peak (Area)	Atomic (%)
C K	691	6.76	3974	23.10
N K	-	-	601	3.76
O K	10134	55.59	3000	9.78
Fe K	24607	24.61	25537	15.18
Co K	12994	13.04	24436	14.58
Au L	-	-	87243	33.60

Figure S3. EDX spectrum of (bottom) Biotin-AuMNPs and (top) bare MNPs.

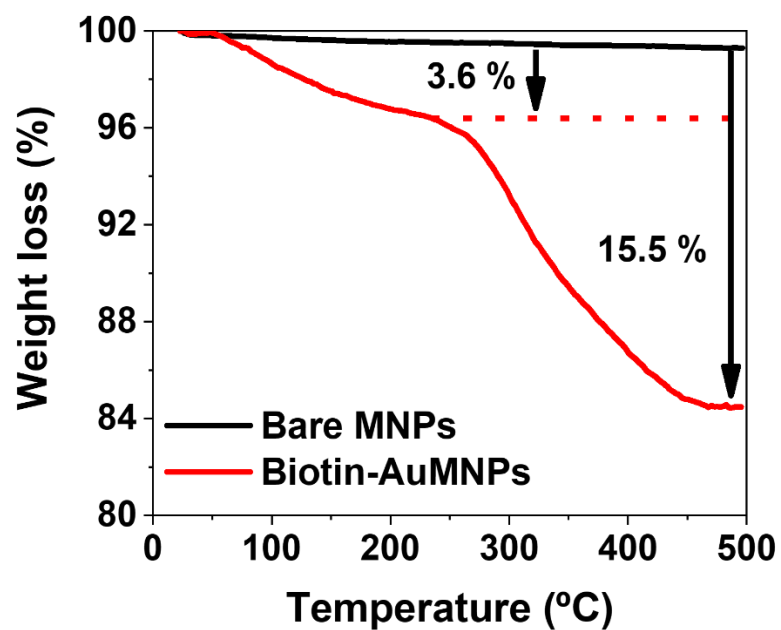


Figure S4. TGA curves of the Biotin-AuMNPs and MNPs.

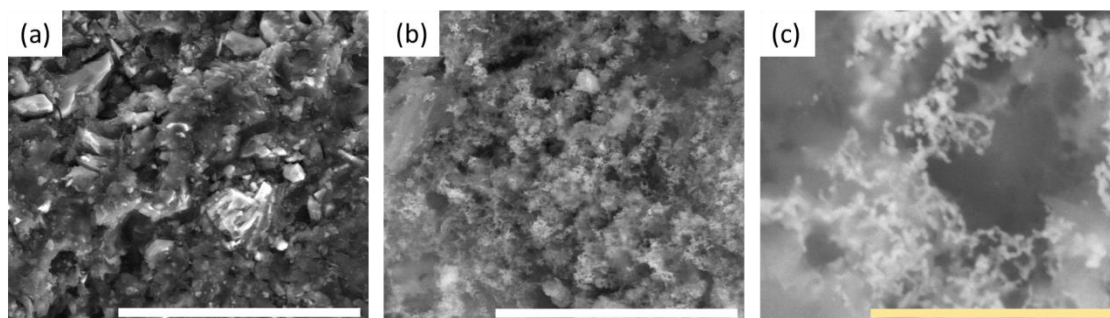


Figure S5. SEM images of bare (a) CGE and (b-C) Biotin-AuMNPs collected on the surface of the CGE. White Bar scale: 20 μm and yellow bar scale: 1 μm

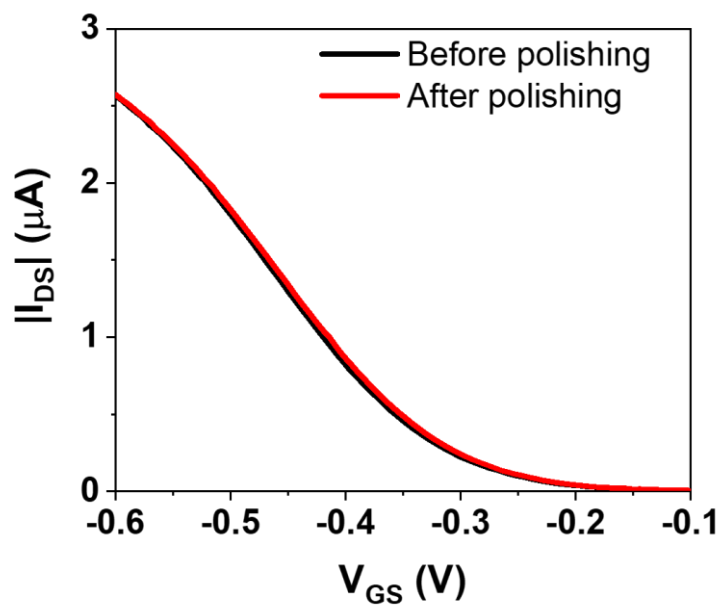


Figure S6. Transfer characteristics ($V_{DS} = -0.1$ V) of the EGOFETs before and after the polishing of the CGEs.

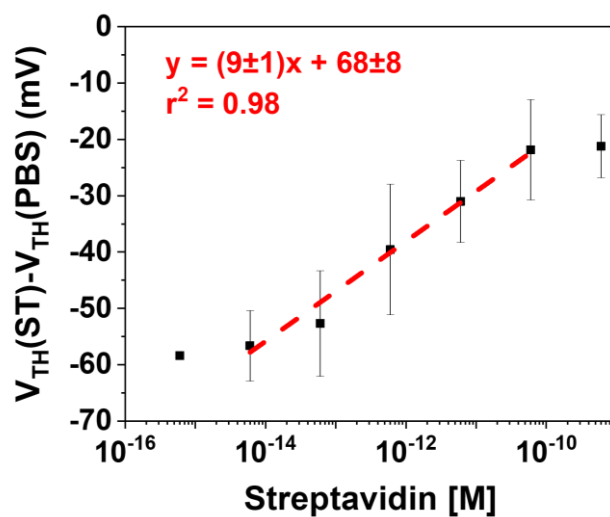


Figure S7. V_{TH} shift vs. Streptavidin concentration plot and calibration curve. The bar error is relative to three different devices.

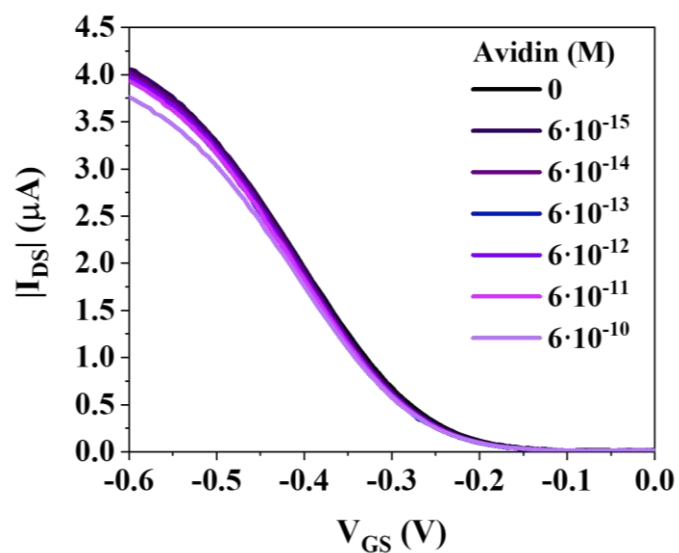


Figure S8. Transfer characteristics ($V_{DS} = - 0.1$ V) of the EGOFETs employing as gate electrode a CGE with collected MNPs incubated in AV solutions of different concentrations.

Method	Limit of Detection (LOD)	Analyte	Transducer	Ref
Competitive Immunoassay	2 pM	Biotin	Antibiotin antibody- magnetic beads and gold nanoparticles	1
Electrochemical	89.1 nM	Biotin	Avidin-immobilized gold electrode with 11-mercaptodecanoic acid	2
	6.6 pM	Biotin	Gold electrode modified with 3-mercaptopropanoic acid and silver nanoparticles	3
	84 nM	Biotin	Streptavidin-modified magnetic microbeads captured by magneto graphite-epoxy composite electrodes	4
	5 nM	Biotin	Nafion-modified boron-doped diamond electrode	5
Field Effect Transistor (FET)	0.4 pM	Avidin	Gold nanoparticles-decorated graphene FET	6
	10 fM	Streptavidin	Amorphous indium-gallium-zinc-oxide (a-IGZO) FET with functionalized extended-gate electrode	7
	2.3 μ M	Streptavidin	Biotin-coated magnetic beads onto the gate insulator of an Ion-Sensitive FET	8
	-	Avidin	Biotinylated organic semiconductor (fluorene and biothiophene co-polymers, F8T2)	9
	-	Streptavidin-Avidin	Bioreceptors anchored onto poly(3-hexylthiophene (P3HT)	10
	6 fM	Streptavidin	Biotin functionalized carbon paste-based gate electrodes	Our Work

Table S1. Comparison of the performance of different sensors reported to detect ST and AV.

Bibliography

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