Supporting Information

Ag@Au nanoprisms-metal organic frameworks-based paper for extending glucose sensing range in human serum and urine

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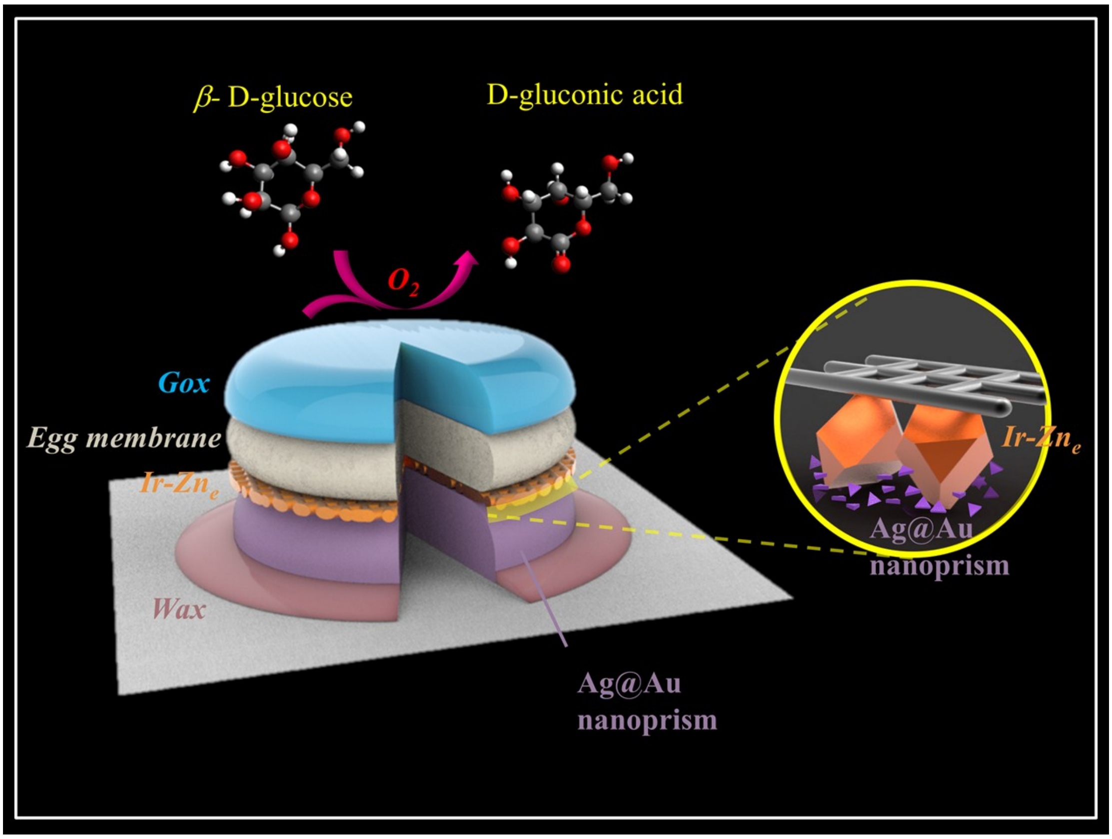
Supplementary materials:



Scheme S1. Schematic illustration of Ag@Au nanoprisms-metal-organic frameworks based paper for glucose sensing.

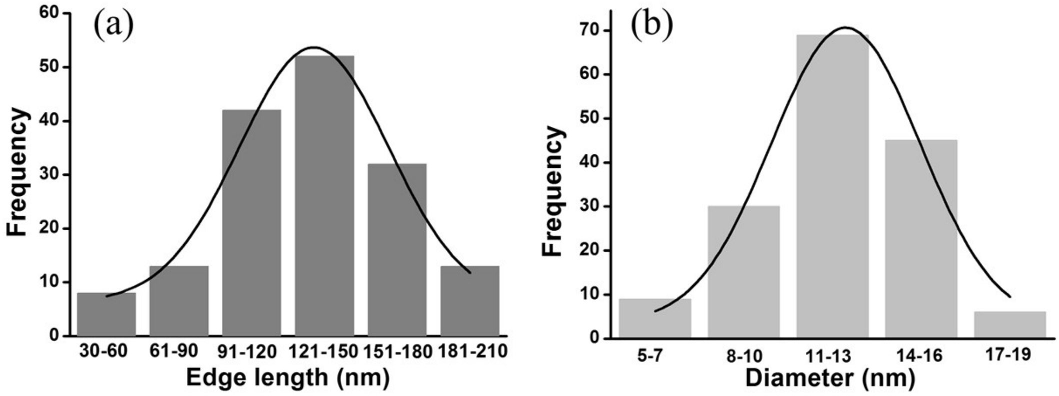


Fig. S1 The histogram analysis of the Ag@Au nanoprism. Histogram showing the particle size distributions of (a) Ag@Au nanoprism and (b) Au nanoparticles was constructed on the basis of six TEM photographs, and a total of ~60 prisms (~160 particles) were used in this histogram.

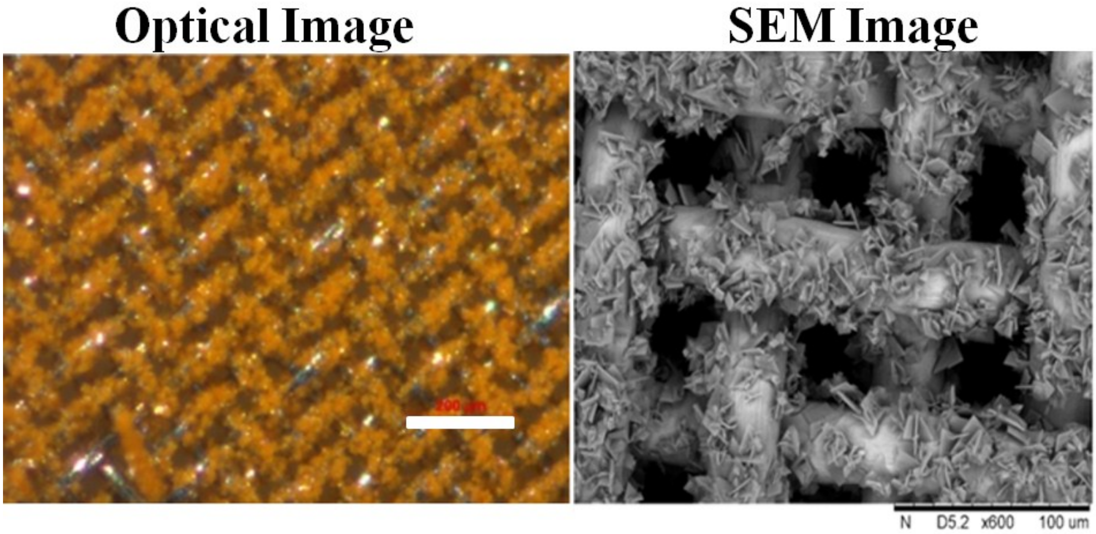


Fig. S2 The optical image (scale bar: 200 μm) and SEM image of Ir-Zn_e.[s1]

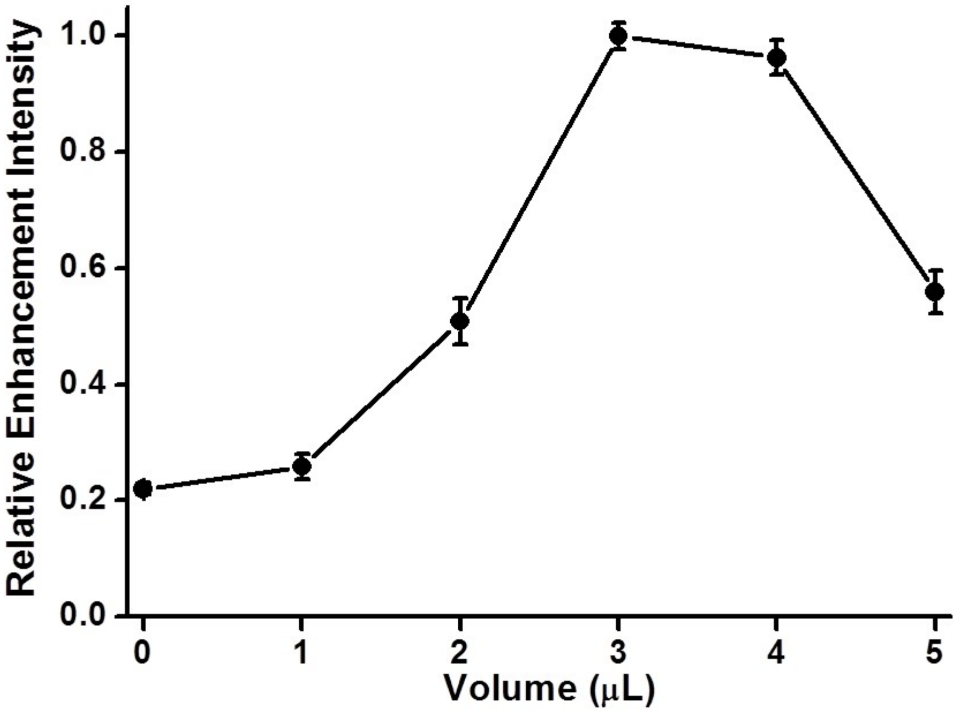


Fig. S3 Effect of the volume of Ag@Au nanoprisms on the relative emission enhancement intensity. Data were obtained from an average value of three replicate measurements.

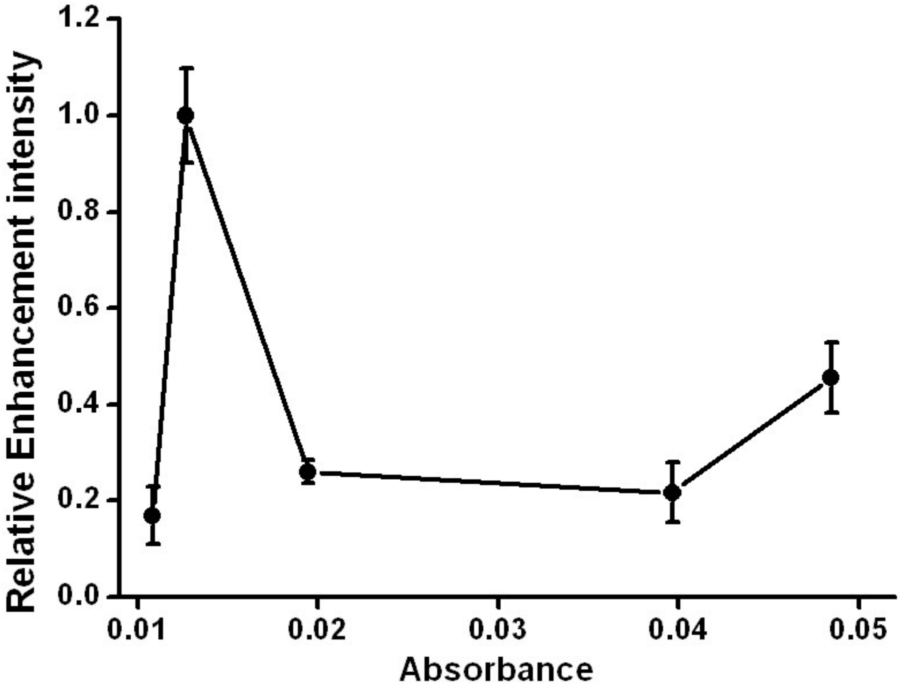


Fig. S4 Effect of the absorbance at λ = 522 nm of Ag@Au nanoprisms on the relative emission enhancement intensity. Data were obtained from an average value of three replicate measurements.

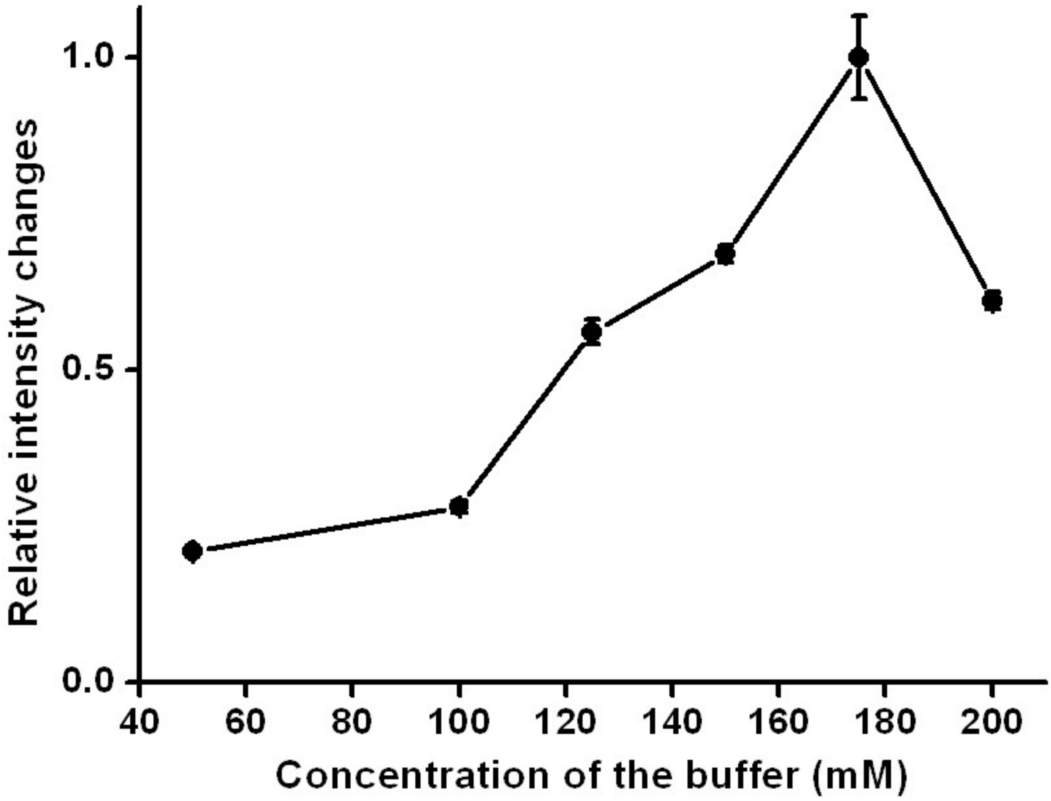


Fig. S5 Effect of concentration of the buffer on the relative emission intensity of Ag@Au-Ir–Zn_e MOFs on paper upon exposure to 5 mM glucose. Data were obtained from an average value of three replicate measurements.

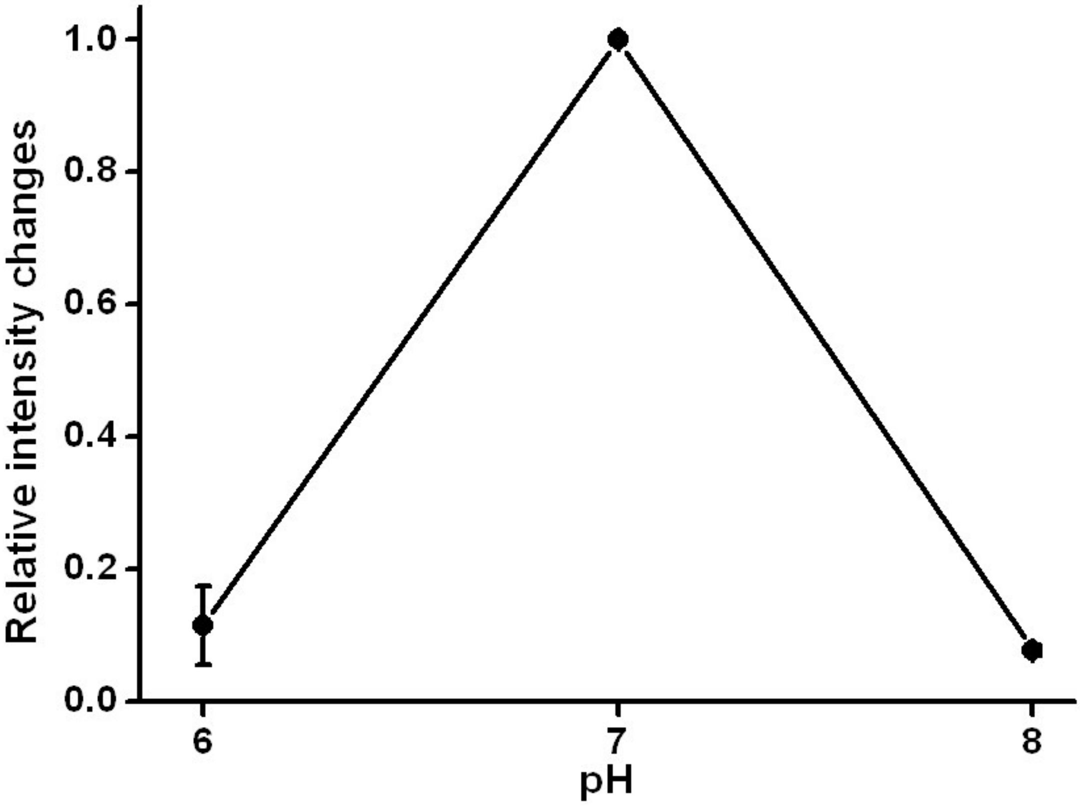


Fig. S6 Effect of pH value of the buffer on the relative emission intensity of Ag@Au-Ir–Zn_e MOFs on paper upon exposure to 5 mM glucose. Data were obtained from an average value of three replicate measurements.

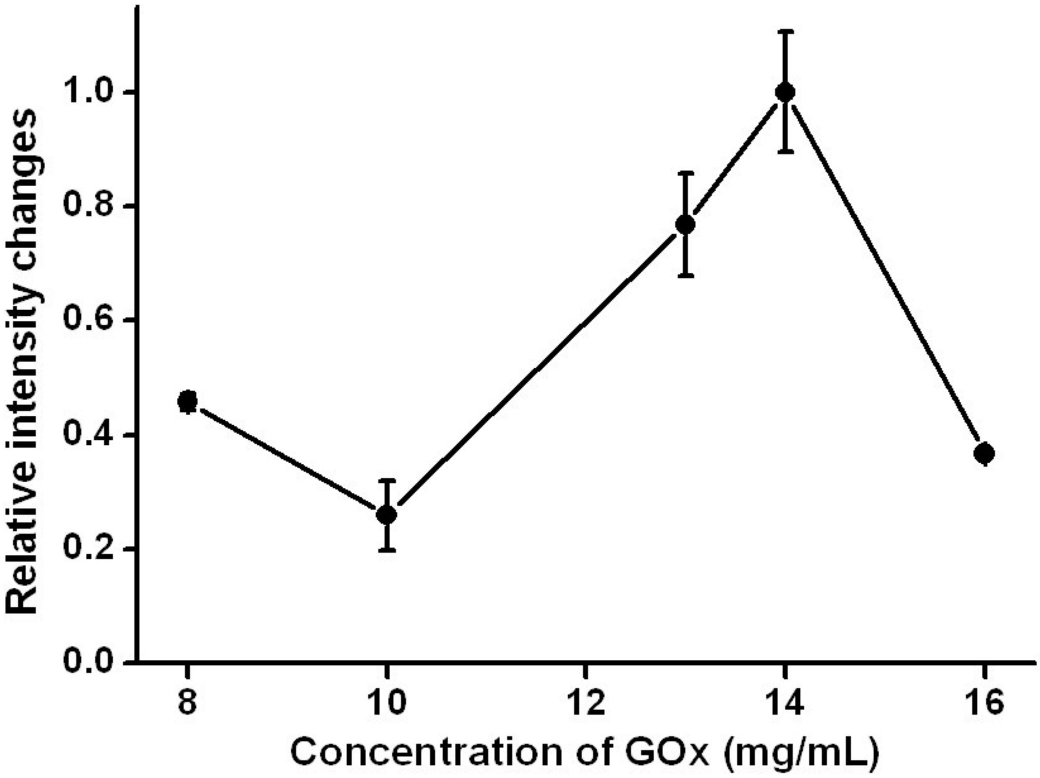


Fig. S7 Effect of concentration of the enzyme on the relative emission intensity of Ag@Au-Ir–Zn_e MOFs on paper upon exposure to 5 mM glucose. Data were obtained from an average value of three replicate measurements.

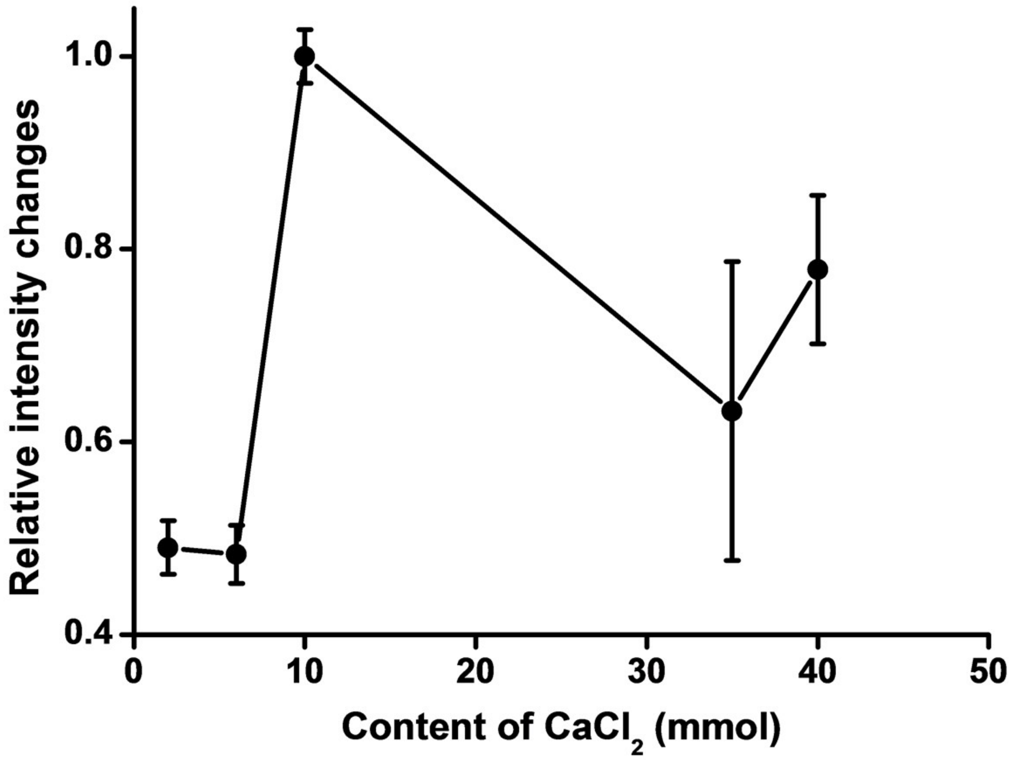


Fig. S8 Effect of content of calcium chloride on the relative emission intensity of Ag@Au-Ir–Zn_e MOFs on paper upon exposure to 5 mM glucose. Data were obtained from an average value of three replicate measurements.

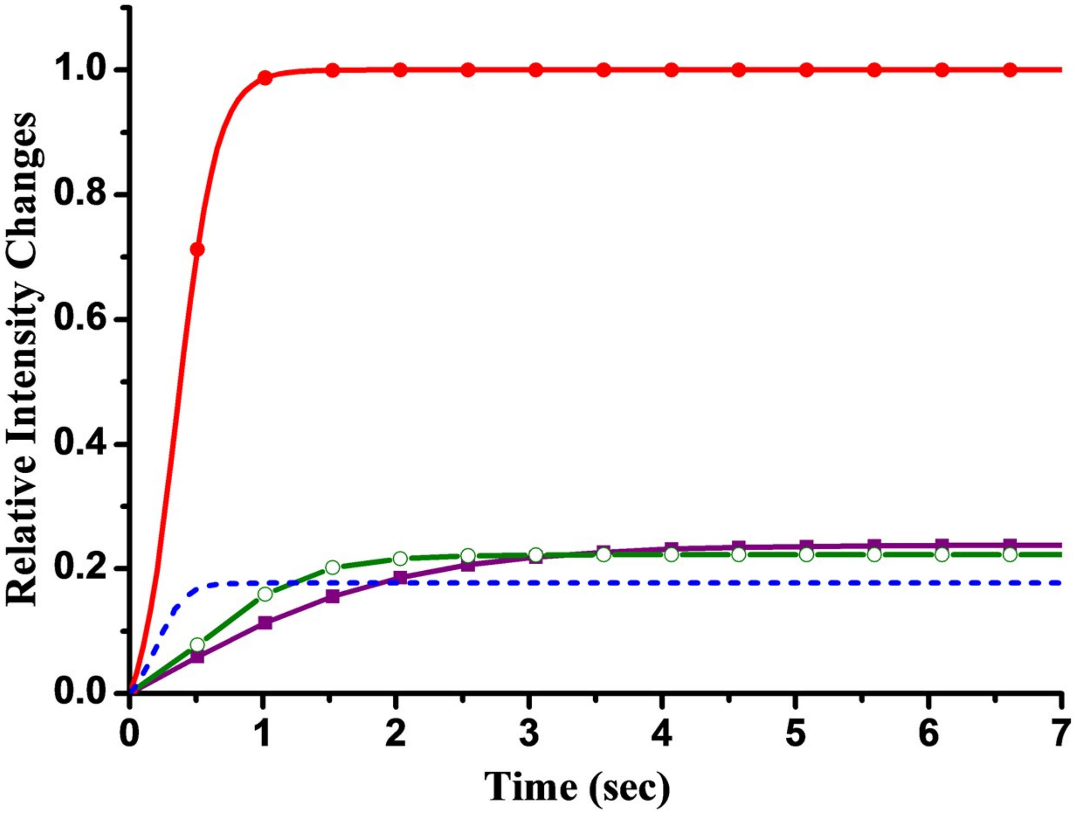


Fig. S9 The relative changes in emission intensity of MOFs (without Ag@Au nanoprisms) on paper (blue, ---), small Ag-Ir–Zn_e MOFs on paper (olive, -○-), of big Ag-Ir–Zn_e MOFs on paper (purple, -■-), and of Ag@Au-Ir–Zn_e MOFs on paper (red, -●-) upon exposure to 3 mM glucose.

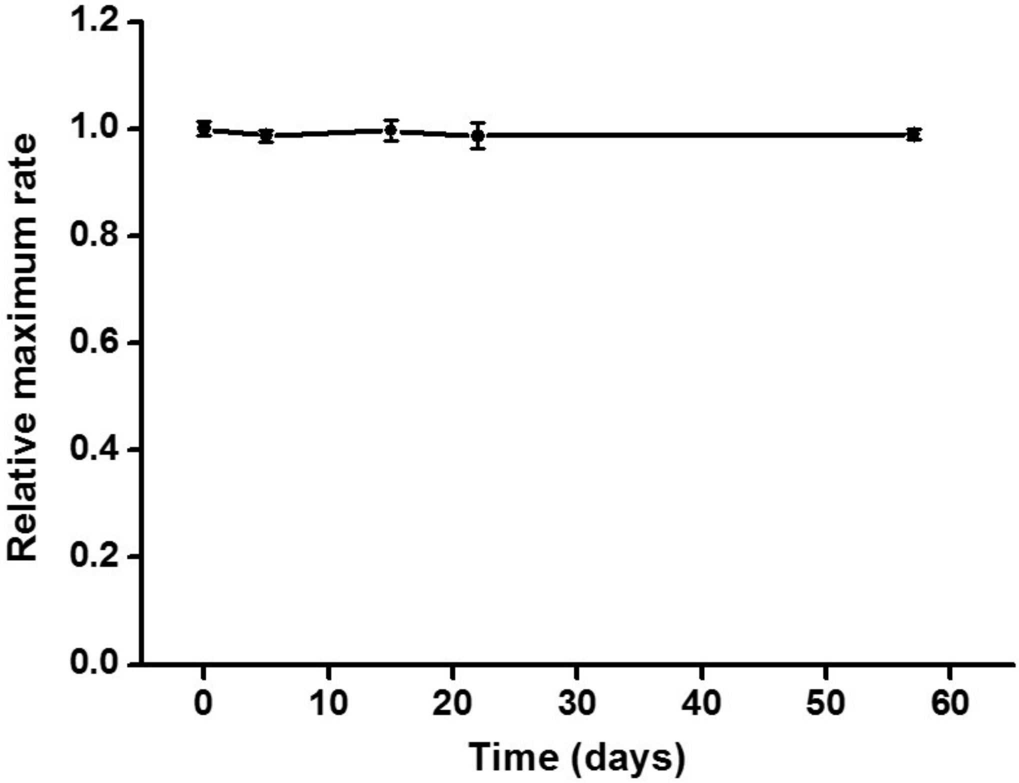


Fig. S10 Storage stability of the biosensor.

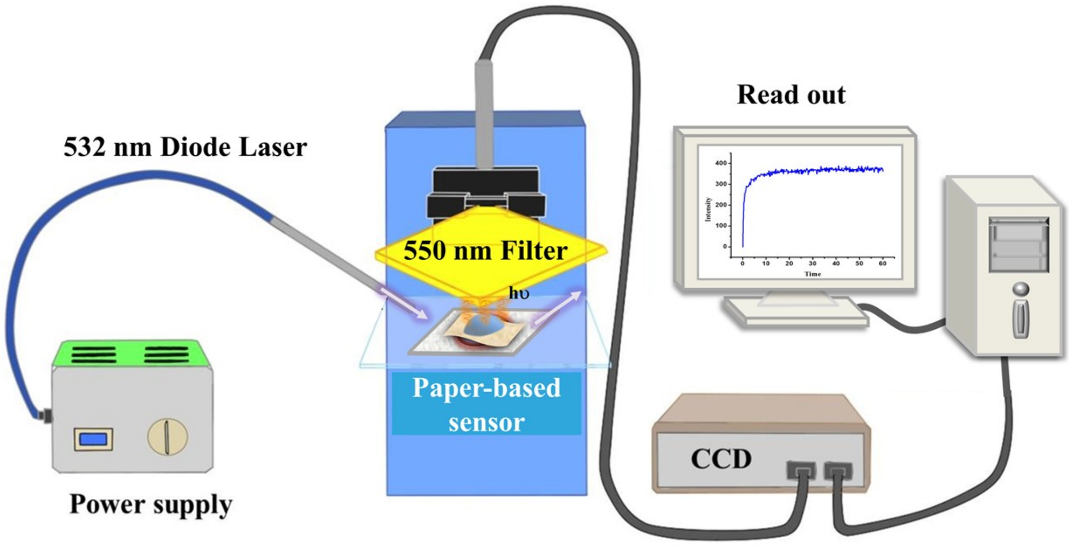


Fig. S11 Scheme of the setup used for the measurement.

Table S1. Comparison of optical methods using nanoparticles for glucose detection.

Nanomaterials	Phenomenon	Linear response range	LOD	Response time	Ref.
CdTe/ZnTe/ZnS QDs	Fluorescence quenched	0.4 ~ 20.0 mM	0.05 mM	N.A.[a]	Wu *et al.* (2010)[s2]
AgNP-CdSe QDs[b]	Fluorescence quenched	2 ~ 52 mM	1.86 mM	N.A.[a]	Tang *et al.* (2014)[s3]
CdTe/CdS QDs-PtF_{20}TPP[c]	Fluorescence enhanced	0 ~ 0.6 mM	N.A.[α]	5 min	Wang *et al.*(2009)[s4]
TiO_2/SiO_2	Phosphorescence quenched	1 nM ~ 10 mM	0.12 nM	< 6 s	Li *et al.* (2009)[s5]
uropium(III) doped Silica NP	Fluorescence enhanced	0 ~ 1.0 mM	4.4 µM	< 20 min	Gao *et al.* (2010)[s6,s7]
Mn-doped ZnS QDs	Phosphorescence quenched	0.01 ~ 0.1 mM 0.1 ~ 1.0 mM	3.0 µM	N.A.[a]	Wu *et al.* (2010)[s8]
CdTe QDs	Fluorescence quenched	0.5 ~ 1.0 mM	0.5 mM	5 min	Li *et al.* (2009)[s9]
CdTe QDs-Au NPs[e]	Fluorescence enhanced	0.0001 ~ 0.05 mM	50 nM	N.A.[a]	Tang *et al.* (2008)[s10]
Carbon Dots	Fluorescence quenched	0.009 ~ 0.9 mM	1.5 µM	60 min	Xia *et al.* (2014)[s11]
Ag/Au nanoprisms	Colorimetry	0.0002 ~ 0.1 mM	0.2 µM	40 min	Xia *et al.* (2013)[s12]
Ag@Au nanoprisms	Phosphorescence enhanced	0.05 ~ 30 mM	0.038 mM	< 0.5 s	This work

[a] N.A. = Not Available. [b] AgNP-CdSe QDs = CdSe QDs assembled on Ag NPs. [c] CdTe/CdS QDs-PtF_{20}TPP = CdSe QDs as one layer and platinum-porphyrin as the another layer. [d] Europium(III) doped Silica NPs = Eu(TTA)$_3$phen (TTA: 2-thenoyltrifluoroacetone, phen: 1,10-phenanthroline) doped Silica NPs. [e] CdTe QDs-Au NPs = CdTe QDs-concanavalin A (ConA)-β-cyclodextrins(CDs)-AuNPs.

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