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Colorimetric sensor for protamine detection based on self-assembly of gold nanorods on graphene oxide

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Supplementary data

Detection of protamine at different pH conditions

The detection of protamine by the developed system at different pH conditions was demonstrated. Since the useful pH range of HEPES is 6.8-8.2, pH at 6.83, 7.42, and 8.23 were selected to represent the detection of protamine in acid, neutral and basic conditions. Figure S1-S3 illustrated the colorimetric response and spectra of AuNRs in the system at the presence and absence of protamine at selected pH conditions. The AuNRs in buffers showed two intense SPR bands indicating stable AuNRs in all selected pH conditions. After mixing with GO, AuNRs self-assembled on GO surface through electrostatic interaction as illustrated by the decrease of plasmon bands of AuNRs. At the presence of protamine in the pH range of 6.8-8.2, GO-protamine complexes were formed preventing aggregation of AuNRs on GO resulted in no change of SPR bands of AuNRs at acidic pH and minor changes at neutral and basic conditions. This result evidenced that the developed system can be applied for protamine detection in the whole useful pH range of HEPES buffer.

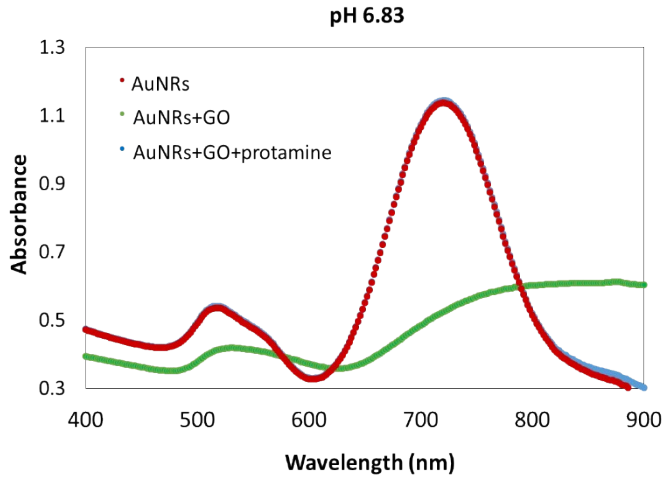

Figure S1 Colorimetric response of AuNRs in the system containing GO in the absence and presence of protamine (500 ng/mL) at pH 6.83.

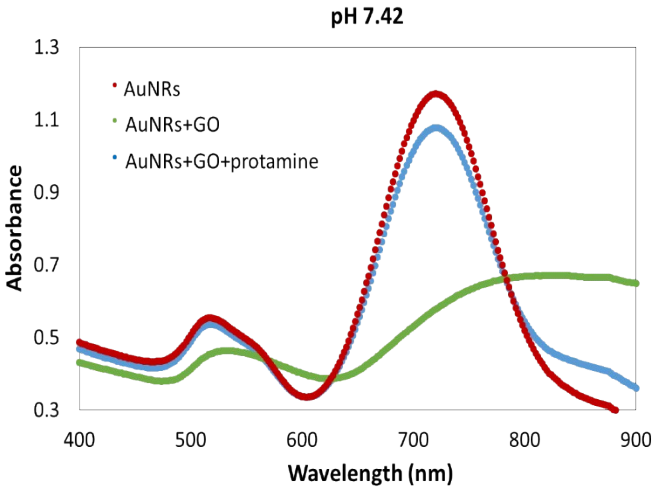

Figure S2 Colorimetric response of AuNRs in the system containing GO in the absence and presence of protamine (500 ng/mL) at pH 7.42.

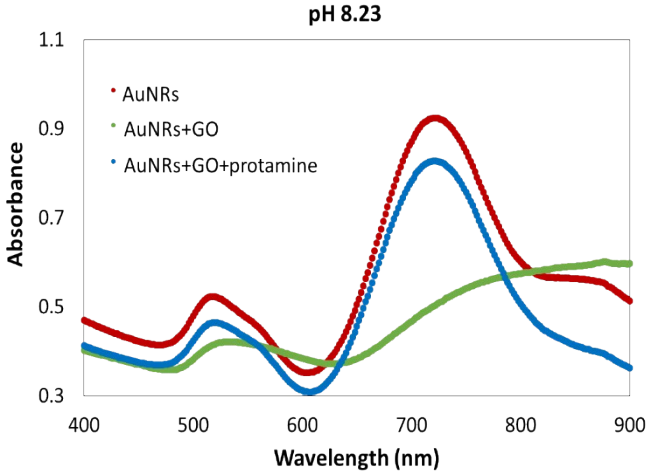

Figure S3 Colorimetric response of AuNRs in the system containing GO in the absence and presence of protamine (500 ng/mL) at pH 8.23.