Supporting Information for:

Ultrafast and Ultrasensitive Naked-Eye Detection of Urease-Positive Bacteria with Plasmonic Nanosensors

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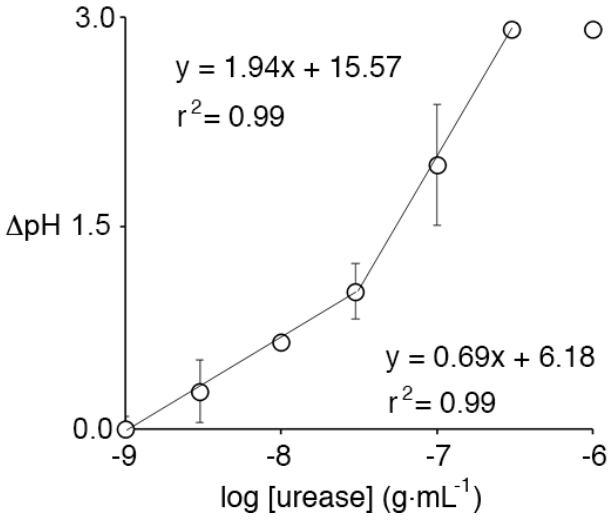

Figure S1. Calibration plot showing the variation of pH produced by urease solutions at different concentrations in the presence of 0.1 M urea (1 mL, 30 min reaction time). Variations in the pH of the solution were measured with pH meter (pH 8+ DHS, XS Instruments). The plot shows two linear regions, one between ΔpH 0 and 1 and another one between 1 and 3. The concentration of urease bound to magnetic beads was determined by interpolating pH variations in this calibration plot and calculating the % recovery with respect to the initial urease concentration added to the solution containing PDDA-beads.

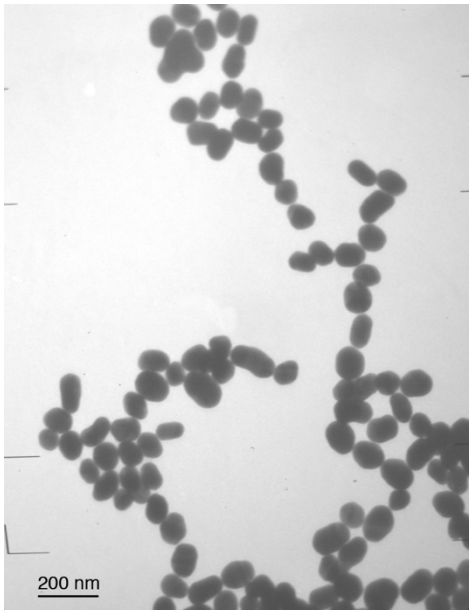

Figure S2. Representative TEM image of gold nanoparticles after adding 1 μg mL^{-1} BSA in deionized water. The assemblies show a mixture of chain-like morphologies and undefined aggregates. The average size was obtained by measuring 100 nanoparticles.

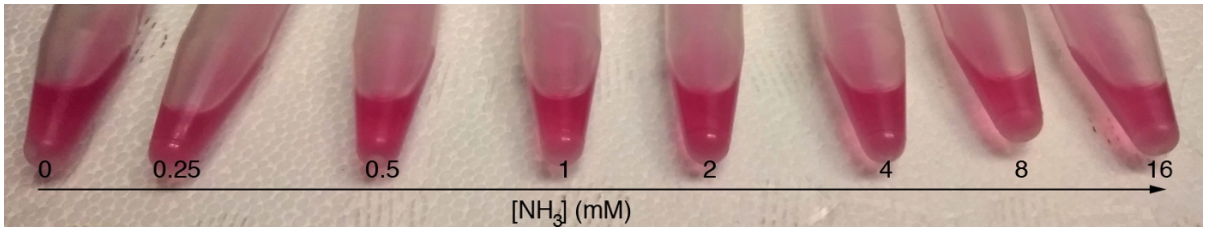

Figure S3. Photographs of nanoparticle dispersions after adding NH_3 at different concentrations. The nanoparticle dispersions did not change color even when NH_3 was added at a much higher concentration than in Figure 2, which demonstrates that, in the proposed concentration range, NH_3 fine-tunes the BSA-induced aggregation of gold nanoparticles but cannot trigger the assembly of the colloids on its own.

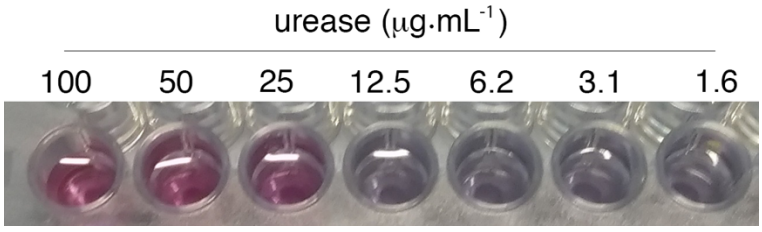

Figure S4. Detection of urease activity with plasmonic nanosensors in the absence of PDDA. 100μL of urease in phosphate buffer was added to each well of a Nunc MaxiSorp plate. After 1 h the plates were washed 3 times with PBS. Then, 100μL of 0.1 M urea containing 1μg/mL BSA was added in each well. The photograph was taken after 30 minutes.

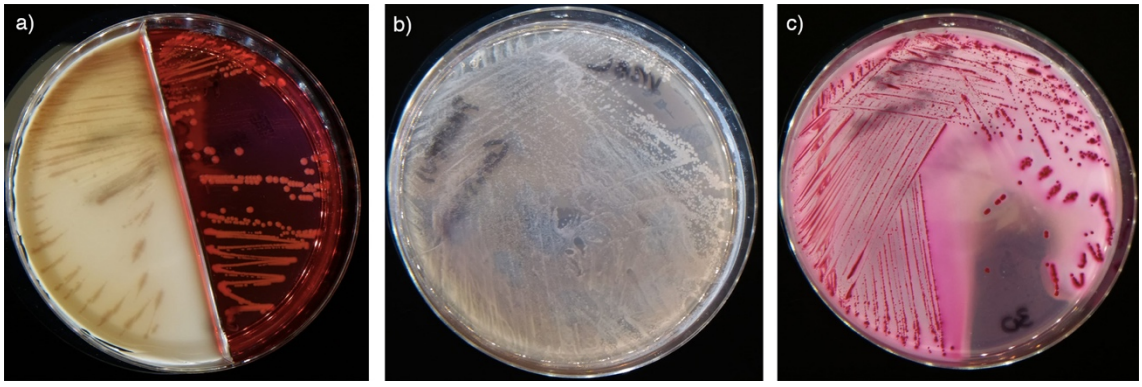

Figure S5. To demonstrate that PDDA-covered magnetic beads can capture *P. mirabilis*, 10 µL of the colloids were added to 1 mL of a bacteria solution containing 10^8 cells mL^{-1}. After washing twice with water, the beads were resuspended in 1 mL of phosphate buffer. The presence of *P. mirabilis* in the sample was demonstrated by plating the beads onto XLD (panel a, red medium on the right), VRBL (panel b) and VRBG (panel c) plates, and then incubating at 37 ºC for 24 h. In panel (a) *P. mirabilis* grows as yellow, opaque colonies without black center; in panel (b) *P. mirabilis* grows as not fermenting straw colonies; and in panel (c) *P. mirabilis* grows as fermenting purple-pink colonies.

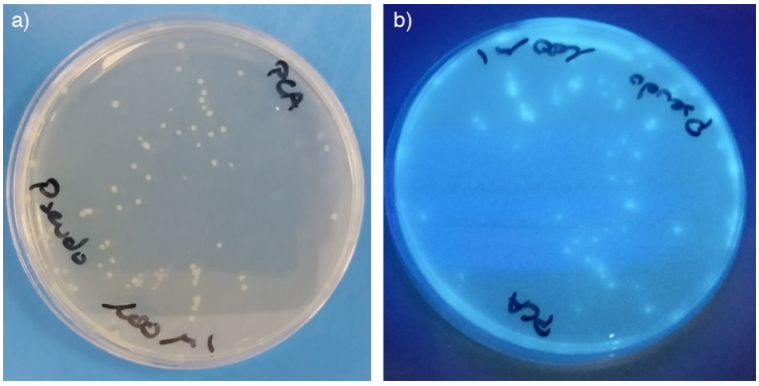

Figure S6. To demonstrate that PDDA-covered magnetic beads can capture *P. aeruginosa*, 10 µL of the colloids were added to 1 mL of a bacteria solution containing 10^8 cells mL^{-1}. After washing twice with water, the beads were resuspended in 1 mL of phosphate buffer. The presence of *P. aeruginosa* in the sample was demonstrated by plating the beads onto PCA media, an incubating at 37 ºC for 24 h. Fluoresce emission was further detected after exposure to 365 nm-UV light.

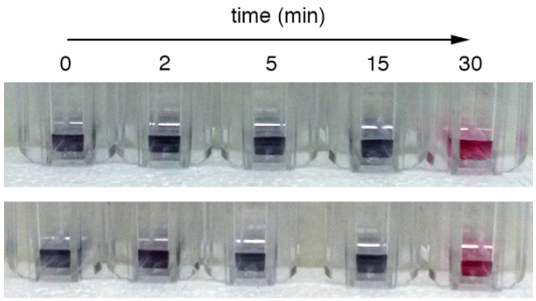

Figure S7. Additional experiments showing the detection of 10^1 cells mL^{-1} *P. mirabilis* with a urea incubation time of 30 min (red-colored solutions).

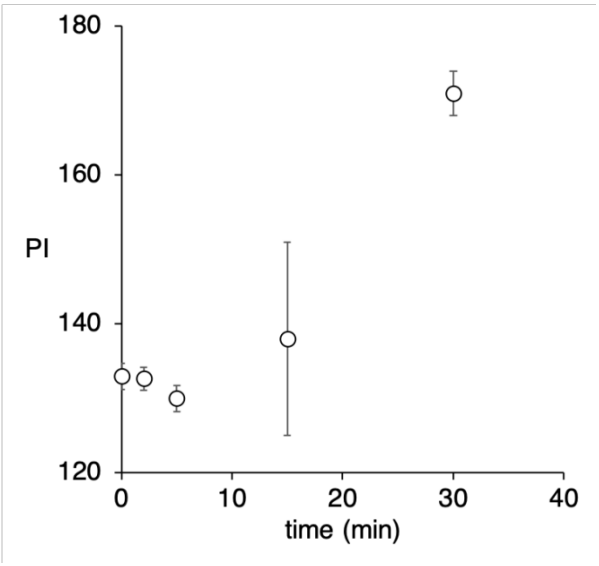

Figure S8. Pixel intensity of the "a" channel in the L*a*b* color space obtained from the photographs of experiments for the detection of 10^1 cells·mL^{-1} *Proteus mirabillis* (Figure S7 and Figure 7, row PM = 0, PM = 10^1. In this Figure, samples yield a signal higher than 2 times de standard deviation of the blank only when the signal generation step is performed for 30 min. Error bars are the standard deviation of the 3 independent experiments.

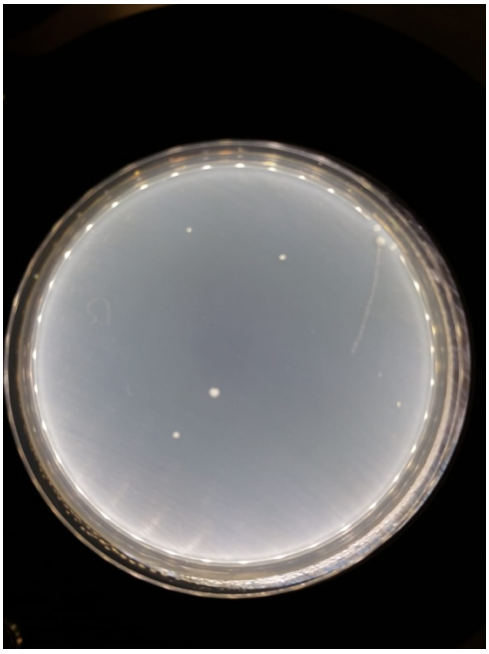

Figure S9. Representative image of a plate after culturing 10^1 cells/mL.

	time (h)								
cfu·mL^{-1}	0.5	1	2	4	7	9	24	30	48
$5{\cdot}10^9$	-	+	+	+	+	+	+	+	+
$5{\cdot}10^8$	-	-	+	+	+	+	+	+	+
$5{\cdot}10^7$	-	-	+/-	+	+	+	+	+	+
$5{\cdot}10^6$	-	-	-	+	+	+	+	+	+
$5{\cdot}10^5$	-	-	-	+/-	+	+	+	+	+
$5{\cdot}10^4$	-	-	-	-	+	+	+	+	+
$5{\cdot}10^3$	-	-	-	-	+/-	+	+	+	+
$5{\cdot}10^2$	-	-	-	-	-	+/-	+	+	+
$5{\cdot}10^1$	-	-	-	-	-	-	+	+	+
0	-	-	-	-	-	-	-	-	-

Figure S10. Detection of *P. mirabilis* at different initial concentrations with urea broth incubated at 37^{o}C for different times. Urease-positive solutions were detected by visual inspection (pink color).