Electronic Supplementary Information

Gold nanoparticle-catalyzed uranine reduction for signal amplification in fluorescent assays for melamine and aflatoxin B1

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Characterization of AuNPs

Fig. S1 Size distribution of the prepared AuNPs determined by DLS.
AuNP-catalyzed uranine reduction

Fig. S2 (A) Time-dependent fluorescence spectra of uranine/NaBH₄ (8 µM/10 mM) and (B) UV-vis absorption spectra of uranine/NaBH₄ solution (20 µM/10 mM) in the absence of AuNPs. (C) Time-dependent fluorescence spectra of uranine/NaBH₄ (8 µM/10 mM) and (D) Absorption spectra of uranine/NaBH₄ solution (20 µM/10 mM) after addition of 20 µL 1 wt % sodium citrate.

The effect of surface coating
**The effect of NaBH₄**

**Fig. S3** Time-dependent changes of the absorbance of an uranine/NaBH₄ solution (20 μM/10 mM) after addition of AuNPs with different surface coatings. The absorbance was recorded at 493 nm, i.e., at the absorption maximum of the emissive dianionic form of uranine.

**Fig. S4** (A) Effect of different NaBH₄ concentrations on the catalytic reduction of uranine (20 μM uranine in 3 mL water, addition of NaBH₄ at different concentrations followed by addition of 20 μL of 16-nm citrate-stabilized AuNPs). (B) Absorption spectra of uranine (10 μM) in water and in aqueous NaBH₄ (20 mM) solution.

**Fig. S5** Effect of pH value on the absorption spectra and fluorescence intensity of uranine. Conditions: 20 μM uranine in buffer with different pH value. The fluorescence was excited at 485 nm and recorded at 528 nm.
The effect of concentration, size and dispersion state of AuNPs

Fig. S6 (A) Effect of AuNP concentration (16-nm AuNPs were used). (B) Influence of AuNP size. [Au] = 0.31 mg/L. (C) Comparison of catalytic activity between dispersed and aggregated AuNPs. Conditions: 20 μM uranine and 10 mM NaBH₄ in 3 mL water, and AuNPs with different volumes, sizes or dispersion states were added.
Detection of melamine

Fig. S7 (A) Schematic illustration of the aggregation of AuNPs induced by melamine. (B) Absorption spectra of AuNPs after addition of melamine with different concentrations and (C) Corresponding image. [Au] = 9.46 mg/L.

Fig. S8 (A) Schematic illustration of the interactions between AuNPs and amino compounds. (B) Absorption spectra of AuNPs in the presence of different amino compounds. [Au] = 9.46 mg/L.
**Fig. S9** Kinetic-based fluorescent assay for melamine in milk ($\lambda_{ex}/\lambda_{em} = 485/528$ nm). (A) Time-dependent fluorescence changes, which correspond to different concentrations of melamine. (B) Dependence of the fluorescence intensity at 30 min on melamine concentration in milk. The fluorescence was excited at 485 nm and recorded at 528 nm.

**Detection of AFB1**

**Fig. S10** Absorption spectra of citrate-AuNPs and Ab-AuNPs in the absence/presence of 2 μM melamine. [Au] = 9.46 mg/L.
**Fig. S11** Dose-response curves of the developed fluorescent immunoassays for the detection of AFB1 in maize extract and in PBS under similar reaction conditions.

**Fig. S12** Kinetic-based fluorescent assay for AFB1 in maize extract ($\lambda_{ex}/\lambda_{em} = 485/528$ nm). (A) Time-dependent fluorescence changes, which correspond to different concentrations of AFB1. (B) The dependence of fluorescence intensity at 20 min on AFB1 concentration in maize extract. The fluorescence was excited at 485 nm and recorded at 528 nm.
Table S1: The detected results of AFB1 in pulverized maize powders and recovery rates.

<table>
<thead>
<tr>
<th>Spiked concentration (μg/kg)</th>
<th>After extraction and dilution (μg/L)</th>
<th>Detected concentration (μg/L)</th>
<th>Recovery rate (%)</th>
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<tbody>
<tr>
<td>8</td>
<td>0.10</td>
<td>0.104 ± 0.022</td>
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<td>40</td>
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<td>0.597 ± 0.084</td>
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<td>80</td>
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<td>0.847 ± 0.103</td>
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