A label-free SERS and LSPR accessible nanoaptasensor for mycotoxin screening test

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Aptamer-based biosensing technology combined with plasmonic nanostructures is an attractive approach to address food toxicity problems [1]. Herein, we present the development of a label-free, selective and accessible gold nanoprisms aptasensor (Figure 1) to detect the presence of two mycotoxins, ochratoxin A (OTA) and aflatoxin B1 (AFB1) [2], by localized surface plasmon resonance (LSPR) and by surface-enhanced Raman spectroscopy (SERS). While one-step LSPR analysis in the Vis-NIR region allowed assessment of mycotoxin adsorption [3], label-free SERS provided the vibrational fingerprint of the molecular system [4] to discriminate mycotoxin solutions within two orders of magnitude dynamic concentration range from 10 to 250 ppb with multivariate analysis. The synthesis of this kind of nanoaptansensors involved simple procedures that could be easily implemented in any research laboratory. Furthermore, batch-to-batch reproducibility was confirmed by testing the performance of seven independently prepared sensors. This label-free nanoaptasensing system represents a new possibility for simpler and more reliable and accessible procedures for mycotoxin screening analysis.

Figure 1: Image of gold nanoprisms aptasensors in suspension used in the screening test.

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