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# Morphological control of nanoprobe for colorimetric antioxidant detection

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## Abstract:

Colloidal metal nanoparticles (NPs) with remarkable localized surface plasmon resonance (LSPR) have found wide use as probes in sensing. The LSPR that employed as the sensing signal is strongly associated with the morphology of nanoprobe. In this work, morphological change of Au nanocage to Au@Ag nanobox and thus the LSPR evolution are well regulated by trace amount of antioxidant, where the mechanism of seed-mediated growth is used as a powerful means in this process. Based on the linear relationship between morphology-induced LSPR evolution and the concentration of antioxidant, a simple, reliable and highly sensitive colorimetric method is developed for antioxidant detection. The detectable range of this method is 0.01–5  $\mu\text{M}$  and 2–20  $\mu\text{M}$  when a UV-vis spectrophotometer and a smartphone are employed as an analyzer, respectively. It has also been successfully applied in the detection of total antioxidants in green tea. This work provides new insights into developing sensitive LSPR-based sensors through precisely manipulating the morphology of nanoprobe.

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