Label-Free LSPR detection of Hypochlorite Ions on Solid-Phase APTES coated substrate based on aggregation property of Dithiothreitol

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Herein, we developed a solid-phase colorimetric sensor for detecting Hypochlorite(OCl-) Ions by using aggregation and anti-aggregation property of AuNPs. When AuNPs are added to a substrate coated with (3-Aminopropyl) triethoxysilane (APTES), electrostatic attraction force between them can make that AuNPs are attached to substrate stably. When Dithiothreitol (DTT) which containing thiol group(-SH) is added onto the substrate, gold and thiol start to bind each other with stronger bonding force, and thus the binding force between AuNPs and substrate is weakened, so the AuNPs start to be aggregated on substrate. Since OCl- has a strong oxidizing property of Thiol, if OCl- and DTT are mixed together, Thiol groups of DTT are oxidized and lose their aggregation property of AuNPs on the substrate, so the aggregation of AuNPs degree is decreased as increasing of the concentration of OCl- ions. Therefore, the concentration of OCl- ions can be quantified by observing the degree of aggregation of AuNPs. by using this colorimetric sensor, OCl- can be detected by naked eye within 5min and the limit of detection is 2.48μM