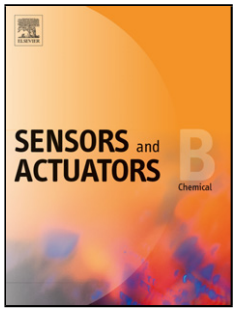

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Target binding and DNA hybridization-induced gold nanoparticle aggregation for colorimetric detection of thrombin

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Highlights

1. We presented a simple and sensitive sensing strategy for thrombin..
2. Target binding-induced DNA hybridization results in the AuNP aggregation.
3. The hybridization pulls a few AuNPs together to form oligomers.
4. A linear dependence (10 nM-5 μM) is obtained with a LOD of 7.5 nM.

ABSTRACT

We present here a simple and sensitive sensing strategy for thrombin in buffer solution and human serum samples. The key features of this assay lie in target binding-induced DNA hybridization and the formation of gold nanoparticle (AuNP) aggregation. In the presence of thrombin, the binding of the two DNA strands to the same target triggers the hybridization between the complementary sequences of the two DNA strands. The hybridization is able to pull a few AuNPs together to form oligomers. A linear dependence between the absorbance and target thrombin concentration is obtained under optimal conditions in the range from 10 nM-5 μM with a detection limit (LOD) of 7.5 nM estimated at the $3S_{blank}$ level. Moreover, this method is successfully applied to complex serum samples without complicated sample pretreatment and sophisticated instruments, a dynamic range (10 nM-5 μM) and a