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Non-covalent Conjugation of CdTe QDs with Lysozyme Binding DNA for Fluorescent Sensing of Lysozyme in Complex Biological Sample

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Abstract

Water-soluble cysteamine (CA) capped CdTe quantum dots (QDs) conjugated with lysozyme binding DNA (LBD) was constructed for luminescent sensing of lysozyme by forming a ternary self-assembly complex. Addition of negatively charged lysozyme binding DNA to the positively charged CA capped CdTe QDs buffer solution (Tris-HCl pH 7.4) could lead to the formation of QDs-LBD complex through electrostatic interactions. Once lysozyme was introduced into the CdTe QDs-LBD system, it could bind specifically with the QDs-LBD complex, resulting in fluorescence emission enhancement of the QDs due to the surface inert of QDs. At a given amount of LBD and CdTe QDs (LBD: QDs=2: 1), the fluorescence intensity enhancement of QDs was linear with lysozyme concentration over the range of 8.9 nM to 71.2 nM, with a detection limit of 4.3 nM. Due to the specific binding of LBD with lysozyme, this approach displayed high selectivity for lysozyme recognition. The sensing mechanism was confirmed by DLS and zeta potential measurement, and