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A novel magnetic/photoluminescence bifunctional nanohybrid for the determination of trypsin

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Abstract

In this work, we have designed a novel kind of nanohybrid with magnetic and photoluminescence (PL) property for trypsin detection. The modified magnetic Fe₃O₄ nanoparticles (MNPs) with polydopamine (PDA) and human serum albumin (HSA) were prepared through a one step self-polymerization under mild condition. The polydopamine (PDA) coating on MNPs can improve the biocompatibility of the MNP-PDA-HSA composite due to its hydrophilicity and multifunctional groups. When MNP-PDA-HSA composite was added into the Anti-HSA modified CdTe QDs (anti-HSA-QDs), HSA on the MNP-PDA-HSA composite was captured by the site of anti-HSA-QDs to form MNP-PDA-HSA/anti-HSA-QDs nanohybrid. Therefore, the photoluminescence of QDs can be quenched by Fe₃O₄ nanoparticles due to the electron transfer. In the presence of trypsin, the protein (anti-HSA) was digested by trypsin and QDs was separated from the nanohybrid surface. As a result, the photoluminescence intensity of QDs was recovered. The magnetic/luminescent bifunctional nanohybrid displayed excellent analytical performance for the detection

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