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Detection of malachite green in fish based on magnetic fluorescent probe of CdTe QDs/nano-Fe₃O₄@MIPs

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Abstract A magnetic fluorescent probe of CdTe QDs/nano-Fe₃O₄@MIPs was prepared using CdTe QDs and Fe₃O₄ nanoparticles as co-nucleus and molecularly imprinted polymers (MIPs) as specific recognition sites based on a reverse microemulsion method. With the specific enrichment and magnetic separation properties, the probe of CdTe QDs/nano-Fe₃O₄@MIPs was used to detect malachite green (MG) in fish samples. The TEM analysis showed that the particles of CdTe QDs/nano-Fe₃O₄@MIPs were spherical with average diameter around 53 nm, and a core-shell structure was well-shaped with several Fe₃O₄ nanoparticles and CdTe QDs embedded in each of the microsphere. Quick separation of the probes from solutions could be realized with a magnet, indicating the excellent magnetic property of CdTe QDs/nano-Fe₃O₄@MIPs. The probe exhibited high specific adsorption toward MG and excellent fluorescence emission at λ_{em} 598 nm. The fluorescence of CdTe QDs/nano-Fe₃O₄@MIPs could be linearly quenched by MG at the concentrations from 0.025 to 1.5 $\mu\text{mol L}^{-1}$. The detection limit was 0.014 $\mu\text{mol L}^{-1}$. The average recovery of spiked MG in fish samples was 105.2%. The result demonstrated that the as-prepared CdTe QDs/nano-Fe₃O₄@MIPs could be used as a probe to the detection of trace MG in fish samples.

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