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Detection of trace tetracycline in fish via synchronous fluorescence quenching with carbon quantum dots coated with molecularly imprinted silica

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Abstract: A novel fluorescence-based sensor combining synchronous fluorescence spectroscopy (SFS) with molecularly imprinted polymers (MIPs) was fabricated with reverse microemulsion method. Tetracycline (TC), (3-aminopropyl) triethoxysilane (APTES), tetraethyl orthosilicate (TEOS) and carbon quantum dots (CDs) were used as template, functional monomer, cross-linker and signal sources respectively in the probe preparation. A synchronous fluorescence emission (λ_{em}) at 355 nm was observed for the prepared MIP-coated CDs (MIP@CDs) particles when the wavelength interval ($\Delta\lambda$) was set as 70 nm, and the synchronous fluorescence intensity could be rapidly and efficiently quenched by TC based on inner filter effect (IFE). The quenching efficiencies of synchronous fluorescence intensity was linearly fitted with tetracycline (TC) concentrations ranging from 0.1 to 50 μmol L^{-1} with a detection limit (DL) of 9 nmol L^{-1} (3σ, n=9). The MIP@CDs was used as a probe to detect TC in fish samples with the recoveries ranging from 98.4% to 103.1% and the relative standard deviation less than 6.0%. The results illustrated that the

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