Short Communication

Ultra-Sensitive Aptasensor Based on IL and Fe₃O₄ Nanoparticles for Tetracycline Detection

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An aptasensor for detecting tetracycline residues in milk was fabricated by depositing an ionic liquid (IL) and Fe₃O₄ magnetic nanoparticles onto a screen-printed electrode (SPE). IL has great conductivity and a large electrochemical window, making it a new green medium for such devices. Fe₃O₄ enhances electrochemical signals and forms films on surfaces well. As the composite mediators, these materials not only accelerated electron transfer but also improved the response speed and precision of the aptasensor. Herein, the synergistic effect of IL and Fe₃O₄ was exploited to construct a sensing interface for amplifying signals. The proposed aptasensor was capable of detecting tetracycline as demonstrated here. The detection range of the aptasensor was 1.0 nM to 1.0×10⁷ nM with a detection limit of 1.0 nM, which is much lower than the maximum residue limit allowed by international regulations (224 nM). The aptasensor demonstrated good selectivity, reproducibility, and stability. Additionally, the sensor can be configured for the detection of other antibiotics.

Keywords: Ionic liquid; Fe₃O₄; Aptasensor; Tetracycline

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