Electro - copolymerization of symmetric flower-like Luminol - Aniline - Hollow TiO₂-NH₂ nano-shell polymer in ionic liquid for Acetochlor detection

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A novel flower-like film composed of uniform hollow TiO₂-NH₂ nano-shell (HTNs), luminol and aniline was synthesized by electro-copolymerization method in acidic ionic liquid EmimCl (IL, 1-ethyl-3-methylimidazolium chloride). The surficial morphology of the film was characterized by scanning electron microscope (SEM), transmission electron microscope (TEM), selected-area electron diffraction (SAED) and atomic force microscope (AFM), which showed the polycrystalline property. Its copolymerization mechanism was discussed in detail, which presented symmetric arrangement. The most obvious multiple increase of peak current in CV indicated the conjugate of HTNs in luminol structure and in aromatic ring skeleton. This film with excellent electrocatalysis performance used for nonelectroactive acetochlor (ACT) detection showed the lowest catalytic potential. Some important parameters were optimized for a homogeneous film and for a sensitive detection. On the optimum film, the electrocatalysis sensor exhibited a linear response within the concentration range of ACT from 2.0×10^{-7} M to 1.5×10^{-5} M, and an absolute detection limit of 0.15×10^{-9} M at a signal-to-noise ratio of 3. Then the proposed method was used for the detection of ACT residue in the real strawberry sample with good results. The promising sensor presents good reproducibility and stability, providing a new fast and sensitive method for the analysis of real samples in environment.

Keywords: Acetochlor; homogeneous nano-conjugation; Electrocatalysis; Ionic liquid EmimCl (1-ethyl-3-methylimidazolium chloride);

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