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MIL-101 (Fe) functionalized Fe_3O_4@polydopamine magnetic microspheres for extraction of sulfonylurea herbicides in environmental water and vegetable samples

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Fe_3O_4 nanoparticles are one of the most promising magnetic nanomaterials with numerous advantages of characteristics and widely used in magnetic fields, especially extraction and separation. Metal-organic frameworks (MOFs) are a new class of hybrid inorganic-organic porous crystalline materials, which are synthesized by self-assembling metal ions with organic ligands via coordination bonds. MOFs possess many unusual properties and fascinating structures, and due to their high porosity, large surface areas, good temperature and chemical stability, etc., MOFs are excellent adsorption materials. Herein, we report a simple one-pot solvothermal method based on poly dopamine (PDA) functionalized Fe_3O_4 particles for the preparation of core-shell Fe_3O_4@PDA@MIL-101 (Fe) composites. The composite was introduced as a magnetic adsorbent to rapidly extract sulfonylurea herbicides prior to analysis with high performance liquid chromatography (HPLC). Significant extraction parameters were optimized separately to improve the extraction efficiencies. Under optimal working conditions, the developed method showed good linearity in the range of 1–150 µg L^{-1}, with correlation coefficients (R_2) higher than 0.9991. A low limit of detection varied from 0.12 to 0.34 µg L^{-1} and good repeatability (relative standard deviation lower than 4.8%, n = 6) were obtained. The proposed method was successfully used to determine four sulfonylurea herbicides in environmental water and vegetable samples with satisfactory recovery ranging from 87.8 to 108.9%. The results demonstrated that core-shell magnetic Fe_3O_4@PDA@MIL-101 (Fe) composites possessed great potential in the extraction of trace sulfonylurea herbicides from environmental samples.
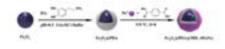
Figure1: *Synthetic scheme for the preparation of Fe_3O_4@ PDA@MIL-101 (Fe) microspheres*

Biography

Yi Yang's research focuses on the Extractive Separation Science, Chromatographic Analysis and Capillary Electrophoresis. An emphasis is placed on the Magnetic Nanomaterial for Pretreatment Techniques. The magnetic adsorbent functionalized with ionic liquids and MOFs have been utilized for extraction of various pesticides from food and environmental samples, such as triazine and sulfonylurea herbicides, phthalate esters, pyrethroid, phenolic compounds, benzoylurea insecticides, etc.

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