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Preparation and characterization of porous ZnFe2O4 hollow fibers with enhanced sensing response and selective detection of acetone

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Food is among the most traded commodities in the world. As markets grow and mass productions increase, there are concerns of safety during production, distribution, and storage. Highly sensitive and selective semiconducting metal oxide-based gas sensors have shown promising potential in detecting spoilage indicators at every stage of production to curb the risk of food wastage and poisoning. Herein, porous hollow ZnFe2O4 fibers were successfully synthesized using a facile combustion method. The phase structure, microstructure, and morphology of the prepared ZnFe2O4 were characterized by X-ray diffraction, high-resolution transmission microscopy, and scanning electron microscopy. The optimized porous ZnFe2O4 fiber-based sensor revealed superior selectivity and a remarkable response of 210 towards 90 ppm of acetone at an operating temperature of 120 ℃. The excellent sensing capabilities can be attributed to high surface area that exposes surface reaction sites and sufficient gas diffusion across the porous sensing layer, having a significant consequence in selectivity. The prepared sensors can potentially be used for selective detection of acetone in spoiling food.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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