ZnO nanoparticle-assisted synthesis of porous interface molecularly imprinted polymeric nanofilm for electrochemical antidepressant sensor

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Abstract
Increasing population and economic activities lead to the release of anthropogenic contaminants, including pharmaceuticals, into the environment. Additionally, antidepressants, especially Fluoxetin (FLX), can undergo 26 transformation products (TPs) which causing a non-negligible impact on human health and ecosystems [1]. This study designed a new strategy to fabricate molecularly imprinted electrochemicals sensors for a novel aspect of molecular imprinting technique, utilizing sacrificial metal oxide nanoparticles [2]. In the first step, the molecularly imprinted polymeric film was fabricated on the glassy carbon electrode (GCE) using 2-hydroxyethyl methacrylate (HEMA)/N-methacryloyl-L-Phenylalanine (MAPA) as basic monomer/functional monomer in the presence of ethylene glycol dimethacrylate (EGDMA) as a cross-linking agent by photopolymerization to produce selective fluoxetine detection. Then, a series of molecularly imprinted polymeric films were synthesized using different template/functional monomer/cross-linking monomer ratios. The ratio of HEMA/EGDMA and MAPA/FLX in the monomer mixture was varied as 5:1, 4:1, 3:1, 2:1, and 1:1. The surface morphology of membranes was studied by scanning electron microscopy (SEM) with diameters ranging from 10 nm to 200 nm. The etching of sacrificial materials, zinc oxide particles were completed in only 15 min by applying 10 mM HCl solution, which also facilitated easy removal of the template and reversible binding during later use. This novel design with multiple recognition sites is quite simple and suitable for detecting antidepressants even at very low levels.

References

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Figures

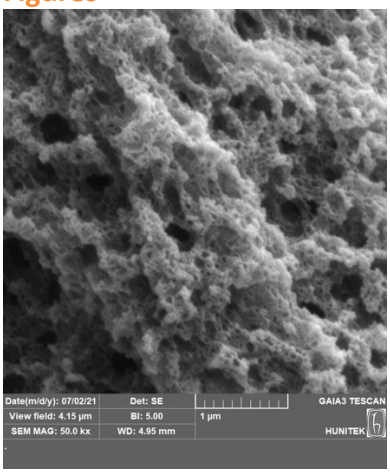

Figure 1. SEM images of the porous molecularly imprinted polymeric nanofilm surface

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