Can graphene oxide improve the performance of biocatalytic membrane?

The presence of micropollutants in water results in serious effects on public health and aquatic ecosystems. Biocatalytic membrane technology has shown great potential for micropollutant removal. However, the efficiency and stability still need to be further improved. In this work, we introduced graphene oxide (GO) and GO derivates into a biocatalytic membrane by reverse filtration and co-deposition methods respectively, in order to explore the role of GO in the biocatalytic membrane. The enrichment effect and catalytic functions of GO improved both the activity and stability of the laccase. Although the bisphenol A (BPA) removal efficiency was not promoted with such a GO-based biocatalytic membrane under flow-through mode, the incorporation of GO in the membrane increased the enzyme loading and its storage stability, which has great potential in BPA detection. Apart from offering a novel strategy to prepare GO-based biocatalytic membranes for micropollutant removal and detection, this work further clarifies the interaction mechanism between GO, laccase and micropollutants, especially in a polymeric membrane matrix.
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