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Covalent immobilization of candida rugosa lipase on a novel enzymatic nanocomposite membrane prepared by covalent attachment of magnetic nanoparticle to poly acrylonitrile membrane

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Enzymatic nanocomposite membranes which are the combination of nanocomposite membranes and immobilized enzymes have received increasing attention, recently. In this study, poly acrylonitrile ultrafiltration membrane was aminated and then magnetic nanoparticles which were modified by glutaraldehyde or cyanuric chloride were covalently attached on the surface of membrane. Afterwards, Candida Rugosa Lipase (CRL) was covalently immobilized on this nanocomposite membrane. Nanoparticles and nanocomposite membrane were characterized with various techniques such as SEM, TEM, XRD, FTIR, ATR, AFM, contact angle goniometry and surface free energy measurement. The evidence of immobilization was also done by ATR, enzyme activity and loading efficiency. It was found that the PAN nanocomposite membrane increased the relative activity and loading capacity in comparison to UF membrane. The Km and vmax values represents the increasing of substrate affinity and decreasing of catalytic activity of immobilized enzyme due to the mass transfer limitation for both nanocomposite membranes. Thermal, storage, and operational stability of immobilized enzyme increased significantly which make it a suitable candidate for to bio-catalytic processes.

Biography

Marzieh Aghababie is a PhD student at University of Isfahan. She is working on her PhD thesis entitled, "Developing an enzymatic nanocomposite membrane bioreactor using immobilized lipase on magnetic nanoparticle for the production of biodiesel". In her Master's, she published three papers in "*Journal of Food Engineering", "Food and Bioproducts Processing Journal*" and "*Nutrition and Food Sciences Research*". Last year, she gave an oral presentation about enzymatic nanocomposite membranes in the international conference on membrane science and technology and published a paper in this regard in "Food and Bioproducts Processing Journal".

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