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ENANTIOSELECTIVE POLYMERIC COMPOSITE MEMBRANE FOR CHIRAL SEPARATION OF RACEMIC MIXTURES

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Many pharmaceuticals exist as a mixture of two enantiomers (optical isomers). Chiral separation of enantiomers is attracting interest as the demand for enantiopure pharmaceuticals is growing dramatically. The biological response such as toxicological behavior, therapeutic activity, or immune response is strongly dependent on the configuration of a given molecule, including its chirality and two enantiomers can display a different optical activity. However as they have the same physico-chemical properties, their separation is a challenging task but is crucial as the incorrect enantiomer of the drug can offer no curative effect or even be detrimental. Optical resolution of racemic mixtures has been broadly studied by various methods including chromatography, diastereomer formation and preferential crystallization. Among these techniques, membrane processes are seen as serious alternatives to established chiral separation technologies, especially since they have lower energy costs, are continuous, eco- friendly, economical and are easy to scale up. In optical resolution, the membrane acts as a selective barrier and transports one of the paired enantiomers preferentially because of a stereo-specific interaction between enantiomers and chiral recognition sites present in the membrane. The chiral recognition can be introduced in the membrane by various means such as incorporation of chiral selectors, grafting of chiral side chains in the polymer, chiral backbone polymer etc. Most studies of chiral separation membranes have been performed using dialysis method, where the driving force for the permeation and separation of chiral chemicals is the concentration difference between feed and permeate. With this method the concentration of the final product is more dilute than that of the feed solution, and permeation is extremely slow. Ultrafiltration or nanofiltration chiral separation membranes, using a pressure-driven force as the driving force could be the answer to these disadvantages. This work focuses on membrane-based enantioseparation technique, performed in pressure driven separation mode, which has the potential for large-scale production of enantiopure compounds and could pave the way for many more commercial applications satisfying the considerable demand for large-scale chiral separation techniques.

BIOGRAPHY

Marine Michel is a Chemical Engineer (ENSIACET, France, 2015) and graduated with a MSc in Chemical Engineering from Imperial College, London, UK (2015). She is now pursuing a PhD degree in membrane separation process at Imperial College London, UK and is a member of the Barrer Center.

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