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Silica colloidal membranes with enantioselective permeability

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Abstract

Robust mesoporous membranes composed of silica spheres were surface-modified with chiral selector moieties, including small molecules, macrocycles, and polymers. Diffusion rates of enantiomers of a chiral dye through the resulting asymmetrically modified colloidal membranes were measured and the corresponding permselectivities were calculated. The membranes showed enantioselectivities in the range of 1.2-1.8, which were not significantly affected by the structure of the surface-immobilized chiral selectors. This selectivity is on par with most reported polymer-based solid membranes and bulk liquid membranes. The enantioselectivity results from the surface-facilitated mechanism of transport of enantiomers through the mesopores. © 2014 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

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Keywords

chiral resolution, membranes, mesoporous materials, silicates