

3-D Disordered Mesoporous Silica (DMS) Molecular Sieves Containing Mixed Matrix Membranes for Gas Separation

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A continuous increase in the emissions of anthropogenic greenhouse gases including CO₂, CH₄, NF₃ and etc. has received worldwide attention due to possible implications on climate change. In order to effectively treat global warming gases, Mixed Matrix Membranes (MMMs) were prepared by incorporating 3-dimensional disordered meso-porous silica (DMS) into polymer matrix to enhance membrane performance. Our current study investigates the effect of DMS particles on the transport of two different glassy polymer matrices. Also, the effect of different amounts of DMS loading on transport properties of various gases will be discussed. Interfacial voids between polymer matrix and inorganic molecular sieves, one of the most challenges associated with MMMs were eliminated due to the penetration of polymer chains into mesopores as well as adequate wetting. The permeability of all the gases tested in this work substantially increased with negligible selectivity loss compared to corresponding bare polymeric membranes, implying that it can significantly reduce the capital cost of membrane unit.