Highly Permselective Mixed Matrix Membranes Based on Interface Control by Graft Copolymer

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Mixed-matrix membranes(MMMs) have been developed to take advantage of the benefits of characteristics of the matrix and filler at the same time. To achieve high performance in MMMs, ZIF-8 shows enhanced gas separation performance due to an appropriate pore size to exclude gas molecules and an affinity for specific gases to improve sorption. We report an interface and interaction tuning approach for a high-performance MMM that not only improves the CO_2 permeability from 70.2 to 687.7 Barrer but also improves the CO_2/N_2 selectivity from 30.5 to 34.9. Poly(vinyl chloride)-g-poly(oxyethylene methacrylate)(PVC-g-POEM) graft copolymer lays a key role as a soft organic matrix to provide good permeation properties, uniform distribution of zeolite imidazole frameworks-8(ZIF-8). Especially, the CO_2/C_3H_8 and CO_2/C_3H_6 selectivities reached 10.5 and 42.7, respectively, for PVC-g-POEM/ZIF(40%) MMMs.