

Hybrid gas separation membranes based on amphiphilic block-graft copolymer with ionic liquid for carbon dioxide separation

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In here, we present the hybrid gas separation membranes consist of amphiphilic block-graft copolymer poly(styrene-block-butadien-block-styrene)-graft-poly(oxyethylene methacrylate) (SBS-g-POEM) and 1-ethyl-3-methylimidazolium dicyanamide (EMIMDCA) ionic liquid. SBS-g-POEM was synthesized by grafting hydrophilic POEM onto SBS via free radical polymerization which is easy, cheap method. SBS-g-POEM has micro-phase separated structure due to its opposite properties of chains. Hydrophilic POEM domain acting as side chain has high affinity with polar carbon dioxide for facilitated carbon dioxide transport. EMIMDCA is the ionic liquid consists of a large cation and anion which induce slight ion displacement for promoting the penetration of carbon dioxide into the free volume of the EMIMDCA, and also induce relaxation of the chains as plasticizer. Only pristine SBS has no miscibility with ionic liquid while SBS-g-POEM has good miscibility for its amorphous domain from POEM. For this, Hybrid gas separation membranes based on amphiphilic block-graft copolymer with ionic liquid could be obtained in homogeneous and lead further enhancement gas separation performance.