

A facilitated transport membrane based on PEMA-g-PPG graft copolymer and partially polarized silver nanoparticles for olefin separation

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A low-cost, one-pot, room-temperature synthesized graft copolymer, i.e., poly(ethylene-alt-maleic anhydride)-g-O-(2-aminopropyl)-O-(2-methoxyethyl) polypropylene glycol (PEMA-g-PPG) is reported for solid-state facilitated olefin transport membranes. The PEMA-g-PPG graft copolymer was synthesized via a facile one-pot polymerization at room temperature. PEMA-g-PPG is an effective polymer matrix for partially polarized silver nanoparticles (AgNPs). Various amounts of AgBF<sub>4</sub> were added to the PEMA-g-PPG graft copolymer solution as a precursor of AgNPs which can facilitate olefin transport through  $\pi$ -complexation. 7,7,8,8-tetracyanoquinodimethane (TNCQ) which is known to be a strong electron acceptor was applied in the solution to activate surface of AgNPs for partial polarization. The FT-IR proved interactions between PEMA-g-PPG and AgNPs. The membrane with 1:3 wt ratio of PEMA-g-PPG:AgNPs showed the best propylene/propane separation performance. A mixed gas permeance was 7.8 GPU and propylene/propane selectivity was 17.5 which was a better performance than membranes based on commercial polymers.