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(57) Abstract :
The titled invention Ionic Liquid Supported Membrane for Enhanced CO2 Separation discloses the invention is related to the efficient gas separation process for a binary gas mixture (CO2/CH4). The world's growing population necessitates the use of natural resources for energy, contributing significantly to global climate change. Carbon dioxide (CO2) is one of the most critical components of the global greenhouse gas phenomenon. Many researchers have been working on CO2 capture and storage technologies as CO2 emission has been extended in recent years. Technologies such as absorption, adsorption, chemical looping/ catalytic conversion, and membrane separations are extensively investigated and well-known for carbon capture and storage (CCS). Membrane separation offers an often-better CO2 capture performance than other approaches. The membrane separation technique for CO2 capture and sequestration has been the most popular among academics over the last two decades since it does not need considerable energy consumption for processing and does not require paying exorbitant chemical prices. In this work, supported ionic liquid membranes are synthesized, and a gas separation study is conducted for binary gas mixture (CO2/CH4). Phosphonium based ionic liquid is used for the fabrication of membranes. The Pebax-1657 with Trihexyl tetradecyl phosphonium bromide [THTDP][Br] concentrations 5%, 10%, 20% (wt.%, based on polymer) were prepared for gas separation study. The interactions of CO2 and CH4 with the ionic liquid were also predicted using density functional theory (DFT) calculations. The gas separation results show that selectivity for the binary gas mixture (CO2/CH4) is 22.28 Barrer. Membrane with 20 wt.% concentration (based on polymer) IL shows higher permeability and CO2/CH4 selectivity.

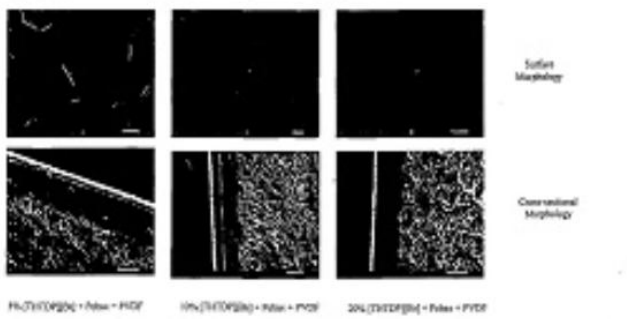

Figure 1: Scanning Electron Microscopic images of fabricated membranes: Surface and Cross-sectional morphology

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