

Selective Polyvinylamine (PVAm)-Graphene membrane for CO₂ capture and gas permeation

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Abstract

Global warming is the effect observed during the last century as a consequence of the rise in the average temperature in the Earth's climate systems. Greenhouse gases as carbon dioxide, methane and nitrous oxide are the principal actors in the global warming[1]. With this precondition the necessity, nowadays, to develop carbon capture and storage (CCS) technologies to reduce of the 20% the carbon dioxide emission within 2050. Membrane separation can be applied to different CO₂ capture processes from pre-combustion (CO₂ -H₂ / CO₂ -CH₄ separation) to post-combustion (CO₂ -N₂) and oxyfuel (O₂ -N₂) and guarantee a high flexibility and potential low operating costs when compared to other capture methods[2][3]. PVAm membrane shows excellent properties in CO₂ selectivity in post combustion gases. Although the good selective properties PVAm shows insufficient mechanical stability in presence of humidity[4]. Here we show an innovative PVAm-Graphene membrane with high mechanical resistance and good selectivity. We observed how a low amount of graphene inside the mixture of the PVAm membrane shows an increase in mechanical properties in humid environment. With the use of an industrial inkjet printer we produced PVAm-Graphene membranes with the possibility of easy scaling up the process in an industrial plant.

References

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Figures



Figure 1: PVAm-Graphene membrane on PET substrate.



Figure 2: PVAm-Graphene membrane on PET substrate.