# Graphenic fillers as stabilizers and permselectivity tuners in highly permeable membranes for gas separation and $CO_2$ Capture

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The addition of few layer graphene (FLG) and graphene oxide (GO) nanofillers in small amounts to permeable polymers used as membranes for gas separation and $CO_2$ capture has been attempted in the last years to improve the permselectivity and durability. We have tested three different polymers suitable for separation, namely poly (phenylene oxide) (PPO), poly(trimethylsilyl propyne) (PTMSP) and a polymer of intrinsic microporosity (PIM-1).

In most cases, GO allows to enhance the permeability of the original materials, due to its intrinsic porosity, while FLG addition is more beneficial to the selectivity, and in general less reproducible. The same effect has been observed on thin films, that are more relevant for industrial applications. Thin films however tend to lose their permselectivity with time. Indeed, the addition of FLG allows to reduce the rate of performance decay with time, without inducing defects.