GRAPHENE OXIDE MEMBRANES FOR GAS SEPARATION

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Recently, the carbon based materials[1] attracted attention of the scientific community for applications in membrane gas separation. Tremendous number of carbon based materials such as carbon nanotubes, chemically modified graphene, graphene oxide (GO) or graphite (nano)particles in mixed matrix membrane (MMM) composites was tested within past decade[2]. It was found that even small loading of graphene and (GO) additives, i.e. 0.05 to 1 wt.%[3], led to considerable changes of composite materials properties (elastic modulus, tensile strength, electrical conductivity, and thermal stability) compared to neat polymers.

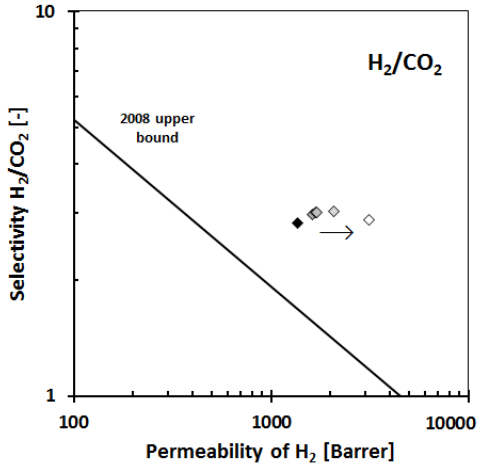

Figure 1 – The H_2/CO_2 Robeson plot with graphene oxide membrane performance. An arrow indicates observed trend in time.

Interestingly, only few experimental gas permeability and selectivity data for non-composite GO membranes have been published yet. In this work, we report large scale preparation of high quality *self-standing graphene oxide membranes* by gravitation assembling and its application for gas separations. Assembled graphene oxide membranes exhibit unique gas separation performance[4] towards H_2/CO_2 and H_2/C_xH_y gas pairs. Especially for H_2/CO_2 (Fig.1) GO membranes far exceeding the corresponding 2008 Robeson upper bound.

Thus, our highly permeable self-standing graphene oxide membranes demonstrate a promising route towards highly-permeable H_2-selective separation membranes for industrial applications.

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