RUBBERY ORGANIC FRAMEWORKS-TUNING THE GAZ-DIFFUSION THROUGH DYNAMERIC MEMBRANES

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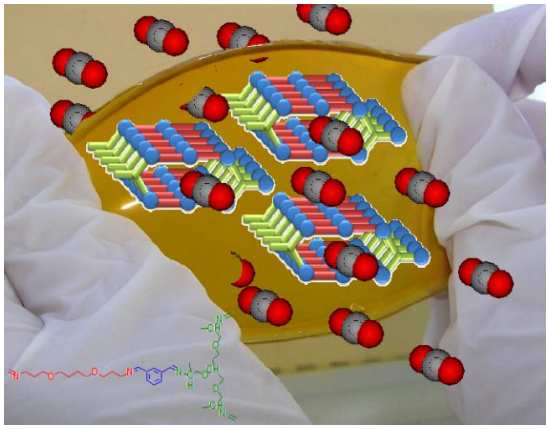
Key Words: Dynamers, gas separation, rubbery membranes, CO_2 selectivity

High permeability whilst keeping a reasonable selectivity is the most important challenge in developing membrane systems for gas separation. Valuable performances are usually obtained with polymeric membranes for which the gas transport is controlled by the gas-diffusivity in glassy polymers and by gas-solubility in rubbery polymers. During the last decade, important advances in this field are related to the molecular control of the gas separation properties. The combination/replacement of classical glassy polymers with metal-organic crystalline frameworks (MOFs, ZIFs, zeolites…) providing reasonable permeability through porous free volume network and high selectivity due to so-called “selectivity centers” specifically interacting with the gas molecules. Despite the impressive progress, important difficulties are observed to get dense mechanically stable thin layer MOFs on various supports. Taking advantage of high permeabilities observed with the rubbery polymers and to their flexible casting properties, there should be very interesting to build rubbery organic frameworks-ROFs, as alternative for gas membrane separation systems. Here we use low macromolecular constituents and dialdehyde core connectors in order to constitutionally generate rubbery organic. Differently to rubbery polymeric membranes the ROFs performances depend univocally of diffusional behaviors of gas molecules through the network. For all gases, a precise molecular composition of linear and star-type macromonomers generates an optimal free volume for a maximal diffusion through the matrix. These results should initiate new interdisciplinary discussions about highly competitive systems for gas separation, constitutionally controlled at the molecular scale.



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