

# Two and Three-component Ionogel Membranes for CO<sub>2</sub> Separation Applications

Liliana C. Tomé

POLYMAT, University of the Basque Country UPV/EHU, Joxe Mari Korta Center, Avda. Tolosa 72, 20018 Donostia-San Sebastian, Spain.

[lilianasofi.carvalho@ehu.eus](mailto:lilianasofi.carvalho@ehu.eus)

Taking into account the extremely broad range of chemical and structural possibilities of ionic liquid (IL) chemistry, and the undeniable engineering and economical advantages of membrane technology, there has been growing interest in the exploitation of ionic liquid-based materials for CO<sub>2</sub> separation membranes [1].

The use of the structure–property relationship of ionic liquids enables the molecular control of their remarkable CO<sub>2</sub>-affinity, while the use of polymer-based networks allows the introduction of structural material features relevant for effective CO<sub>2</sub> removal from process streams containing other gases, such as CH<sub>4</sub>, N<sub>2</sub> and H<sub>2</sub>.

In this communication, a perspective on different strategies to design CO<sub>2</sub> selective ionogel membranes consisted of polymers, ionic liquids and porous fillers will be presented [2-4]. The membranes were prepared either by casting or UV polymerization in the presence of different ionic liquids bearing fluorinated or cyano-functionalized anions. The compatibility and miscibility of the different ionogel components were evaluated. The obtained membranes were characterized in terms of structural, thermal, mechanical and morphological properties. Single gas permeation experiments were performed and the results compared to the Robeson's upper bound limits.

The aim is to show the versatility of these materials, point up their easy preparation,

and reveal insights into the relationships between gas transport properties, ionic liquid structures, polymer features, diverse porous particles and ionogel compositions. What is more, breakthroughs and key challenges on polymer-based ionogel membranes will be discussed, as well possible paths for future research.



**Figure 1:** SEM image and schematic representation of a three-component mixed matrix membrane consisting of poly(ionic liquid) (PIL), ionic liquid (IL) and porous filler (MOF).

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## References

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