

# IONIC LIQUIDS – INNOVATIVE MATERIALS FOR CO<sub>2</sub> CAPTURE AND CONVERSION

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Ionic liquids (ILs) have gained popularity over the past 15 years and have become products of industrial application, instead of just being lab curiosities. This process has taken longer than anticipated, but finally more and more applications move to piloting and then to full commercialization. One of those technologies involves the use of ionic liquids for CO<sub>2</sub> capture and conversion.

The current process to capture CO<sub>2</sub> is based on highly corrosive and volatile aqueous amine solutions, but due to their ability to retain CO<sub>2</sub> - both physically and chemically ILs are a good alternative.<sup>1</sup> The benefits of ILs includes reduction of water and energy consumption, release of VOC to atmosphere and corrosion of plant components.

We have shown that 1-alkyl-3-methylimidazolium tricyanomethanides exhibit a considerable increase of both CO<sub>2</sub> solubility and the diffusivity in binary systems consisting of IL and water in comparison to dry solvents. This is a considerable improvement since water usually impairs the efficiency of the CO<sub>2</sub> capture.<sup>2</sup>

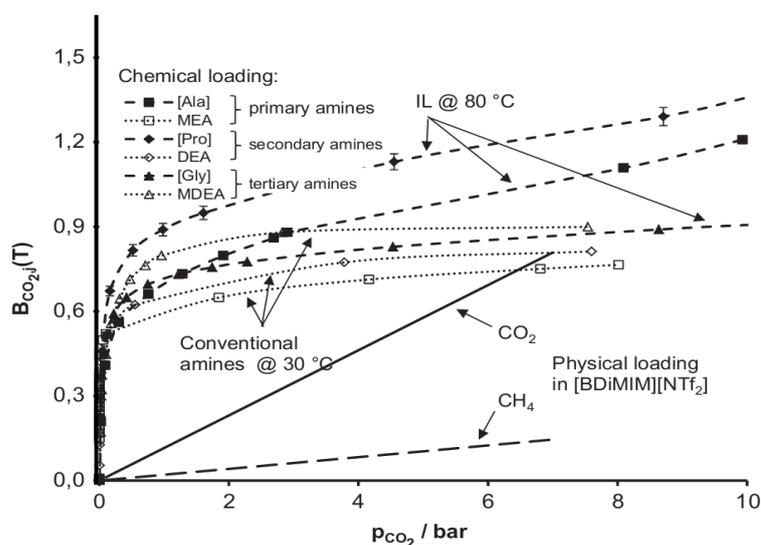


Figure 1 Comparison of CO<sub>2</sub> absorption capacity of ILs and common solvents

The major benefit of the IL based process is the reduced energy consumption in regeneration, especially when a pressure swing is used instead of the classical thermal swing. At higher pressures the IL performs better than common solvents (Figure 1). This technology allows also for the capture of CO<sub>2</sub> directly from the air.

Current research activities concentrate on the utilization of so captured CO<sub>2</sub> for conversion into other products *e.g.* formate and methanol also in the presence of ILs. In this case the IL shows great conversion improvement compared to aqueous solutions.

We will present the view and research results of a company, specialized in the synthesis and technology development in the field of ionic liquids, which has been on the market for more than 15 years.

#### Refs.

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- [2] Romanos, G. E. Lawien, F. Z. Likodimos, V. Falaras, P. Kroon, M. C. Iliev, B. Adamova, G. Schubert, T. J. S. *J. Phys. Chem. B.* **2013**, *117*, 12234-12251.