IOLICAP

Project ID: 283077
Funded under: FP7-ENERGY

Novel IONic LIquid and supported ionic liquid solvents for reversible CAPture of CO2

From 2011-12-01 to 2016-02-29, closed project | IOLICAP Website

Project details

<table>
<thead>
<tr>
<th>Total cost:</th>
<th>Topic(s):</th>
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<tbody>
<tr>
<td>EUR 5 770 719</td>
<td>ENERGY.2011.5.1-1 - High-efficiency post-combustion solvent-based capture processes</td>
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<th>EU contribution:</th>
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<td>EUR 3 978 128</td>
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<th>Coordinated in:</th>
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<td>Greece</td>
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<th>Call for proposal:</th>
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<td>FP7-ENERGY-2011-1 See other projects for this call</td>
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<td>CP - Collaborative project (generic)</td>
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Objective

The current requirements of the Post Combustion CO2 Capture (PCC) technology are: a) Reducing the parasitic energy load, b) Effectively addressing corrosion, c) Faster absorption/stripping rates, d) Less viscosity and less use of water, e) Confronting the problem of solvent degradation and volatility. These problems pose stimulating challenges for the synthesis of new solvents, aided by detailed molecular modeling of sorbate/sorbent interactions, and for new integrative module designs that enable their effective implementation in a process environment.

In this context the IOLICAP proposal gathers expertise and skills from the domains of chemical synthesis of Ionic Liquids (ILs), molecular simulation/mechanical statistics, phase equilibrium, electrochemistry/corrosion, physicochemical/thermophysical characterisation, nanoporous materials & membrane technology and process engineering, aiming at the development and evaluation of novel Task Specific Ionic Liquid (TSILs) solvents that (a) short-term could replace the alkanolamines in currently existing PCC installations and (b) long-term would lead to the establishment of a novel CO2 capture process, based on hybrid absorption bed/membrane technology that will incorporate TSIL modified porous materials and membranes.

Task Specific Ionic Liquids exhibit enhanced CO2 capture capacity, which is above the 0.5 mol/mol limit of the currently applied amine solvents. Due to the high number of possible IL structures that will be synthesised during the project and the easy tuneability of their chemical and physical properties it is expected that loading capacities above the threshold of 1 mol/mol will be achieved. In addition, ILs are less corrosive than amines and are dissociated so there is no need for using large quantities of water. ILs are also less volatile and less sensitive to flue gas impurities a fact that ensures less need for timely injection of fresh solvent. The aforementioned properties which will be studied and verified during the project, will have a high impact on the energy intensity of the capture process since they can lead to a significant reduction of the Scrubber/Stripper units size and consequently of the parasitic energy load.

Ionic Liquid membranes are lately examined as candidates for CO2/N2 separation exhibiting performances that are above the boundary limit of a Roberson plot for this separation. IOLICAP project targets at the optimisation of the stability, selectivity (200), flux properties (1000-2000 Barrers) and production cost of Task Specific Ionic Liquid membranes and at the further enhancement of the process efficiency, through a combination of membrane technology with bed adsorption. Membrane technology is the less energy intensive candidate for CO2/N2 separation since there is no need for regeneration and constitutes a much more versatile and economically feasible technology especially for applications in energy intensive industry like the cement, steel and refineries.

Related information
Final Report Summary - IOLICAP (Novel Ionic Liquid and supported Ionic Liquid solvents for reversible CAPture of CO2)

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**Subjects**

Energy Saving

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