Amino-Acid-based Task Specific Ionic Liquids for CO_2 capture

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The problem of the high concentration of CO_2 in the atmosphere is encouraging the development of novel and efficient system for the reversible capture of the CO_2. The amine scrubbing of flue gases is a well-known technology but it still has several drawbacks (*e.g.* corrosion and toxicity). Recently Task Specific Ionic Liquids (TS-ILs) have been considered as alternative for the highly efficient capture of CO_2 via chemical fixation [1] and overcome the performance of the usual aqueous amine solution. Nonetheless, the most common cations employed in ILs, imidazolium, pyridinium and phosphonium, revealed to be not environmental friendly and to be toxic for the microorganisms and cells. Instead, the cholinium-based ILs demonstrate to be an interesting alternative to usual ILs [2]. The Choline is a water-soluble essential nutrient, it has relatively low toxicity and it consists of a tetraalkyl-ammoniun head linked to a polar hydroxyl tail. On the anion side, the amino acids (AA) are a fully sustainable and non-toxic source of counter-ion with amine functionalities. The first synthesis of Choline AA-ILs was carried out through Choline Hydroxide intermediate [1]. Only recently, a newer and simpler method was developed to synthetize the Choline AA-ILs [3].

In this work, the CO_2 absorption of two Choline-based AA-ILs were studied, aiming to enlight the mechanism of absorption. Choline Glycinate and Choline Alaninate were synthetized using the newer method. The absorption of the pure AA-ILs and their solutions with DMSO were measured, as well as other chemo-physical properties. The overall mechanism of absorption was deeply investigated by means of infrared spectroscopy using a peculiar Attenuated Total Reflectance setup in order to determine the interaction between the IL, the solvent and the CO_2.

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[2] X.D. Hou, Q.P. Liu, T.J. Smith, and M.H. Zong PLoS ONE, **8** (2013) e59145.
[3] S. Bocchini, S. Hernandez, S. Bianco, A. Chiappone, G. Saracco, C.F. Pirri, (2016) Merck Young Chemists Symposium, Rimini (IT), 25-27th October, 2016. p. 24