

Effect of Cu(I) additive on sorption by imidazole based ionic liquids studied by in situ ATR-FTIR spectroscopy

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Ionic liquids (ILs) are low-temperature molten salts, which have a number of unique physical and chemical properties. ILs are assumed to be applied in the selective separation of ethane and ethylene [1]. In order to improve the separation efficiency, additives of transition metals could be used, e.g., Cu (I) and Ag (I), capable of forming π -complexes with alkenes [2].

FTIR spectroscopy is a convenient method that allows investigating the mechanisms of interaction between the sorbed gas molecules and IL, which remains an important aspect for designing new materials [3].

During the study of ethylene sorption by $[\text{C}_6\text{Mim}][\text{Hal}]$ ILs (Hal = Cl, Br, I) with additions of Cu(I) halides, it was found that as the content of the Cu(I) in the IL increases, a change of the band shape of ethylene out-of-plane bending vibrations is observed, with the proportion of interacting ethylene enhancing (Fig. 1). The alteration is likely to occur in the contributions of various mechanisms of ethylene sorption.

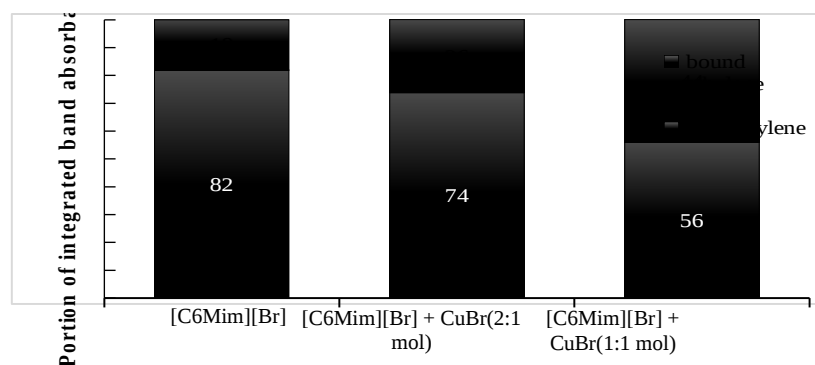


Fig. 1 – Effect of CuBr on ethylene sorption by $[\text{C}_6\text{Mim}][\text{Br}]$. Temperature is 25°C, ethylene pressure is 20 atm.

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