Thermodynamic Properties and Polymorphism of Bis(Trifluoromethanesulfonyl)Imide Ionic Liquids
- IACT Doctorate Award Presentation -

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Thermodynamic properties of 1-alkyl-3-methylimidazolium bis(trifluoromethanesulfonyl)imide ionic liquids [$C_n$mim][NTf_2] (n = 2, 4, 6, 8, 14) are reported. Heat capacities of different phases in the temperature range (5 to 370) K, parameters of the phase transitions and the glass transitions were determined by adiabatic calorimetry, and heat capacities in a liquid state to 500 K by scanning calorimetry. It was found that [$C_n$mim][NTf_2] formed three crystalline phases with T_{fus} of 257.0, 265.0, and 271.3 K, and [C_8mim][NTf_2}] formed two phases with T_{fus} of 256 and 265 K. For all the phases the enthalpies of phase transitions were determined. For [C_4mim][NTf_2] and [C_6mim][NTf_2] heat capacity in the crystal state near 230 K could differ by 2 % and depended on thermal history of the samples, but T_{fus} for different crystals were the same. The most important factors affecting the ease of formation and stability of the crystalline phases were a maximum temperature achieved during the crystallization process and an amount of impurities in a sample.

Thermodynamic properties of the substances in the condensed state were calculated from the above data.

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