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Ionic Liquids: Trends in Behavior and Miscibility with Polymers[1]

MICHELLE CHEN, RONALD WHITE, JANE LIPSON, Dartmouth Coll — Trends in polymer solution miscibility can be understood by analyzing the properties of each pure component. In this work, families of ionic liquids were characterized using the Locally Correlated Lattice (LCL) model that was previously used to study numerous polymers as well as their solutions and blends. Ionic liquids were divided into families that incorporated size variation into each of the components. The cationic species comprised members of the CnMIM (1-alkyl-3-methylimidazolium) family with n ranging from 2 to 10. The anionic component varied from BF_4 to PF_6 to NTf_2 (bis(trifluoromethylsulfonyl)amide). Each liquid was characterized using the LCL equation of state and properties such as percent free volume and cohesive energy density were calculated. These properties were observed to be correlated with alkyl chain length and anion size within each family. Analyzing these trends points towards a fundamental understanding of ionic liquid miscibility with poly(ethylene oxide), members of the polymethacrylate family, and others.

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