

Abstract Submitted
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Effect of Water on Cellulose – EMIM Ac – DMSO Solution XIN

ZHANG, Department of Materials Science, Univ of Maryland-College Park, MD, YIMIN MAO, NCNR, NIST, Gaithersburg, MD, DOUG HENDERSON, R. M. BRIBER, HOWARD WANG, Department of Materials Science, Univ of Maryland-College Park, MD — Mixtures of ionic liquids (IL) and polar aprotic solvents are found to be effective for dissolving cellulose to form a molecular solution. Cellulose is naturally hygroscopic and water is generally detrimental to the processing of cellulose using ionic liquids. It is important to understand the role of water in the dissolution and processing of cellulose. The effect of water on the dissolution process of cellulose in the solvent mixture – DMSO - 1-Ethyl-3-methylimidazolium acetate (EMIM Ac) has been examined by polarized microscopy, small angle neutron scattering (SANS), small angle X-ray scattering (SAXS) and cloud point measurements. It was found that the presence of small amounts of water led to clustering of cellulose that could be disrupted by increasing temperature. However at high cellulose concentration, addition of water can facilitate the formation clear solutions and gels. Liquid crystalline behavior was observed in solutions with ~1%wt of water and ~20 %wt of cellulose. A structural repeat distance around 1.2 nm has been observed by SAXS, presumably from the alignment of cellulose chains. Phase diagrams of the solutions will also be presented.

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