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Dissolution of cellulose in ionic liquids via polyelectrolyte interaction

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Cellulose is the most abundant natural resource on earth, and has many advantages, such as good biocompatibility, biodegradability and regenerative properties, for which reason cellulose has been widely used in all cultures for centuries as valuable materials, mainly for textiles industries, paints industries and biomedical material fields. Cellulose is insoluble in water and in most common organic liquids because of its stiff molecules and the supramolecular structures formed by the interactions of numerous inter- and intra-molecular hydrogen bonds. Ionic liquids (ILs) is considered as the potential “green” and “designable” solvents for cellulose. But the dissolution mechanism of cellulose in ILs has not been clearly revealed. A practical approach to reveal the dissolution mechanism is to study the chain conformation of cellulose in ILs. In this work, we studied the behavior of cellulose and its derivative in ionic liquid by using laser light scattering (LLS). Our work is to determine whether cellulose is in the state of aggregation or single chain in ILs, and explain the dissolution process. Single chain conformation was observed in cellulose/IL solution, while aggregation was observed in its derivative solution. LLS and zeta potential analysis indicated that cellulose exhibited the feature of polyelectrolyte after dissolution in IL.

Biography

Ye Chen has completed his PhD from Donghua University in China at 2011 and Post-doctoral studies from King Abdullah University of Science and Technology (KAUST) in Saudi Arabia. Now he joined the College of Material Science and Engineering in Donghua University as an Associate Professor. His research is about the solution property of biopolymers, and the preparation of advanced nanocomposites and its application.

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