

Rheological Properties of Cellulose/TBAF/DMSO Solutions and Their Application to Fabrication of Cellulose Hydrogel

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Abstract : The development of hydrogels with a high mechanical strength is important for numerous applications of hydrogels. As a material for tough hydrogels, cellulose has attracted much interest. However, cellulose cannot be melted and is very difficult to be dissolved in most solvents. Therefore, its dissolution in tetrabutylammonium fluoride/dimethyl sulfoxide (TBAF/DMSO) solvents has attracted researchers for chemical processing of cellulose. For this reason, studies about rheological properties of cellulose/TBAF/DMSO solution will provide useful information. In this study, viscosities of cellulose solutions prepared using different amounts of cellulose and TBAF in DMSO were measured. As expected, the viscosity of cellulose solution decreased with respect to the increasing volume of DMSO. The most viscous cellulose solution was achieved at a 1:1 mass ratio of cellulose to TBAF regardless of their contents in DMSO. At a 1:1 mass ratio of cellulose to TBAF, the formation of cellulose nanoparticles (467 nm) resulted in a dramatic increase in the viscosity, which led to the fabrication of 3D cellulose hydrogels.

Keywords : cellulose, TBAF/DMSO, viscosity, hydrogel

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