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Cellulose/PSA alloy fibers with advanced properties

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Cellulose fibers have unique advantages including good wearing comfort, hygroscopicity and permeability, which are widely used in the fields of garments, household and industry. However, cellulose fibers are flammable which limits its applications in some special fields. In order to prepare flame-retardant fibers with improved flame retardancy, hydrophilic and mechanical properties, the flame retardant polymer, aromatic polysulfonamide (PSA), was selected to be blended with cellulose with 1-butyl-3-methylimidazolium chloride ([BMIM]Cl) as solvent. The cellulose/PSA alloy fiber with the "sheath-core" structure was successfully prepared by dry-jet wet spinning technology. The effect of weight ratio, viscosity ratio of cellulose and PSA solution as well as spinning technology on the properties and phase morphology of the cellulose/PSA alloy fibers were studied in detail. The flame retardant

properties of the alloy fibers were improved as the viscosity of PSA/[BMIM]Cl solution was lower. The contact angle and the water retention values of the alloy fibers showed that the moisture absorption was strengthened with the addition of the cellulose. PSA in blend solution with lower viscosity could migrate towards the out layer of the fibers, and cellulose in blend solution with higher viscosity stated in the core during the spinning process, which improved the flame-retardant property of the alloy fibers at a certain blend ratio. It is shown that the LOI, as well as the surface property varied not only with the weight ratio of cellulose and PSA but also with the viscosity ratio of two composites and the spinning technology. Therefore, the flame retardant and mechanical properties of the cellulose/PSA fibers could be optimized according to the various factors during spinning process.

Biography

Yumei Zhang is the Professor in fiber materials, College of Materials Science and Engineering at Donghua University. She is an expert in the area of fiber processing dynamics and technology for about 20 years.

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