

Preparation of Wool Fiber/Keratin/PVA Film and Study on Their Structure and Properties

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Abstract : Every year, numerous organic wastes from fiber byproducts of the wool textile industry, poor quality raw wools not fit for spinning, horns, nails and feathers from butchery are disposed. These wastes are abundant in keratin which is a renewable material. Wool fiber/keratin/PVA composites with different proportions were prepared in this study, and the influence of the proportions on their structure and properties were studied, aiming to understand the potential application of keratin in the field of biomedicine, degradable wrapper, and cosmetics film, and provide a new way to reuse keratin wastes. The urea / sodium sulfide / sodium dodecyl sulfate (SDS) method was used to dissolve the wool. After filtration and dialysis, the wool keratin solution was achieved. Then the keratin solution and polyvinyl (PVA) solution were blended in different proportions, and the wool fibers cut into a certain length were cast into the blended solution. Thereby, various wool fiber/keratin/PVA composite films with different proportions were formed through pouring the solution into a flat box and drying at room temperature. The surface morphology, molecular structure, and mechanical property of the composite films were studied. The results showed that, there are α -helix structure, β -sheet and random coil conformations in the pure keratin film, as well as in the wool fiber. Compared with wool fiber, the crystallinity of keratin decreased. PVA can obviously improve the mechanical property of the blended film. When the blended ratio of keratin and PVA is 20:80, the mechanical property of the blended film is greatly improved. The composite films with 8%-16% of wool fibers have better flexibility than those without wool fibers.

Keywords : composite film, keratin, mechanical property, morphological structure, PVA, wool fiber

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