

来酸改性木质素制备超柔性/紫外线屏蔽的明胶/ 木质素薄膜

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摘要: 利用马来酸对碱性木素和木质素磺酸钠进行化学改性, 可用于生产超柔性明胶薄膜。两种木质素酰化改性前后的形态和化学结构发生了明显的变化, 对比结果表明, 羧基和 C=C 成功接枝到木质素上, 导致木质素的理化性质发生变化。与酰化改性的木质素磺酸钠相比, 酰化改性的碱性木素 (MAL) 更适合制备明胶 (GEL)/木质素复合膜, 能够使明胶薄膜保持透明性并具有优异的紫外线屏蔽能力。GEL/MAL 复合膜的断裂伸长率是纯明胶薄膜的 2 倍以上, 极大地解决了纯明胶薄膜在使用过程中的脆性问题, 表明酰化改性的碱性木素可以作为替代甘油的可再生添加剂。本研究的结果也证明了木质素的来源和结构会影响其与明胶溶液的相容性, 较高的失重率和较低的热降解温度表明, 明胶/木质素复合膜在使用寿命结束时更容易热降解。这项研究为明胶和木质素生产可再生生物薄膜提供了一种潜在且有效的方法。

Maleic acid modified lignin for preparation of ultra-flexible and UV shielding gelatin/lignin films

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Abstract: Alkaline lignin and sodium lignosulfonate were chemically modified by using maleic acid for potential application on the production of ultra-flexible gelatin films. The comparison results in morphology and chemical structures of the two types of lignin before and after modification revealed that carboxyl and C=C groups were successfully grafted onto the lignin, resulting in the changes in physical-chemical properties. Compared to modified sodium lignosulfonate, modified alkaline lignin (MAL) was much more appropriate in the preparation of gelatin (GEL)/lignin films by endowing the films with transparency and excellent UV light shielding ability. Elongation at break of GEL/MAL films were more than two times that of the pure gelatin film, which greatly addressed the brittleness issues of the pure gelatin films during use, indicating that the modified alkaline lignin could be used as renewable additive with replacement of glycerol. The results in this study also gave evidence that the sources and structure of lignin affect its compatibility with gelatin solution. The higher weight loss rate and lower pyrolysis degradation temperature indicated that the gelatin/lignin films were much more easily thermal degradable at the end of service life. This research provided a potential and efficient approach on the production of renewable and biological films from gelatin and lignin.