
可再生资源高分子共混与复合材料

Polymer Blends and Composites from Renewable Resource

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摘要 (ABSTRACT)

近年来，可再生资源高分子材料越来越引起人们的兴趣。这很大程度上归因于两个主要原因：一是人们对环境问题的关注，二是石油资源的危机。而在中国，通过增加农副产品的附加值来帮助解决“三农”问题也增加了人们对可再生资源高分子材料的兴趣。可再生资源高分子可分为三类：（1）天然高分子，如淀粉、蛋白质和纤维素等；（2）天然单体的合成高分子，如聚乳酸（PLA）；（3）来自微生物发酵作用的高分子，如聚羟基丁酸酯（PHB）。与许多其他石油基高分子相似的是，可再生资源高分子的许多性能可通过混合或复合得到改善。

A special group of polymers, those from renewable resource, has attracted an increasing amount of attention over the last two decades, this has predominantly been due to two major reasons: environment concerns and limitations of our finite petroleum resources. Generally, polymers from renewable resources (PFRR) can be classified into three groups: (1) natural polymers, such as starch, protein and cellulose; (2) synthetic polymers from natural monomers, such as polylactic acid (PLA); (3) polymers from microbial fermentation, such as polyhydroxybutyrate (PHB). Like the most of polymers from petroleum, the polymers from renewable resource are rarely used singly today. Actually, the history of the composites from renewable resource is far longer than conventional polymers. In the biblical Book of Exodus, Moses's mother built the ark from rushes, pitch, and slime, a kind of fibre-reinforced composites according to the modern classification of material. During the opium war about 200 years ago Chinese built their castles to defend invaders using a kind of mineral particle reinforced composites made from glutin rice, sugar, calcium carbonate and sand. Modern technologies provide powerful tools to elucidate microstructures at different levels, and to understand the relationships between structures and properties. These new levels of understanding bring opportunities to develop materials for new applications.

The inherent biodegradability of natural polymers also means that it is important to control the environment in which the polymers are used, to prevent premature degradation. For example, the water solubility of many natural polymers raises their degradability and the speed of degradation, however, this moisture sensitivity limits their application. Another limitation of many natural polymers is their lower softening temperature. The new materials of blends and composites are extending the utilization of polymers from renewable resource into new value-added products. This presentation reviews the recent advances in polymer blends and composites from renewable resource and introduces potential applications for this materials group.