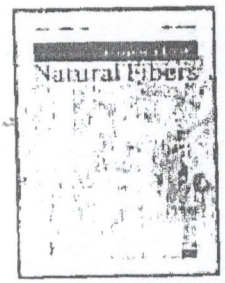

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Effect of Alkali-treatment on Structural, Thermal, Tensile Properties of *Dichrostachys Cinerea* Bark Fiber and Its Composites

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ABSTRACT

The effect of alkali-treatment of the chemical composition, structure, thermal stability, tensile strength, and surface topology of *dichrostachys cinerea* bark fibers (DCFs) was analyzed by Chemical analysis, XRD, FTIR, TGA, SEM, and AFM in this investigation. The alkali treatment of raw DCFs with 5% (w/v) NaOH and 90 min of soaking period were recognized to be optimal by the chemical analysis. It is interesting to notice that optimally treated DCFs own improved cellulose (78.4 wt.%), lesser hemicellulose (4.6 wt.%) and lignin (9.12 wt.%) contents, increased crystallinity index (65.63%), tensile strength, thermal stability, and improved surface topography compared with raw DCFs. The findings revealed that optimally treated DCFs were appropriate fiber as reinforcement material in polymer composites. The various weight percentages of raw and optimally treated DCF composites were prepared by hand lay up and compression molding methods. Further, the mechanical testing of prepared composites was undergone as per the ASTM standard.

KEYWORDS

Dichrostachyscinerea fibers; chemical analysis; thermal stability; surface topology; scanning electron microscope; tensile strength

关键词

纤维; 化学分析; 热稳定性; 表面拓扑结构; 扫描电子显微镜; 抗拉强度

摘要

摘要采用化学分析、XRD、FTIR、TGA、SEM和AFM等手段，研究了碱化处理对灰树花树皮纤维(DCFs)化学成分、结构、热稳定性、拉伸强度和表面形貌的影响.

化学分析结果表明，用5% (w/v) NaOH和90min浸泡时间对原料DCFs进行碱处理效果最佳. 值得注意的是，与未处理的DCFs相比，经过优化处理的DCFs具有较好的纤维素(78.4 wt.%)、较低的半纤维素(4.6 wt.%)和木质素(9.12 wt.%)含量、较高的结晶度指数(65.63%)、较高的抗拉强度、热稳定性和较好的表面形貌. 结果表明，在聚合物复合材料中，对DCFs进行优化处理是合适的增强材料. 采用手糊法和模压法制备了各种比例的DCF复合材料，并对其进行了优化处理. 此外，制备的复合材料的机械测试按照ASTM标准进行.

Introduction

Growing environmental responsiveness all over the world has steered scientists to create new green materials that increase the environmental quality of products (Indran, Edwin Raj, and Sreenivasan 2014). Among organic fillers, plant fibers deliver a number of advantages as reinforcement for polymers. Many natural fibersrevealnoticeable properties such as high-specific modulus, strength, excellent process ability, easily available, easy to extract, easy to handle, light weight, easy to fabricate as composite, biodegradability, and cost-effectiveness (Senthamaraikannan et al. 2016). Along with

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