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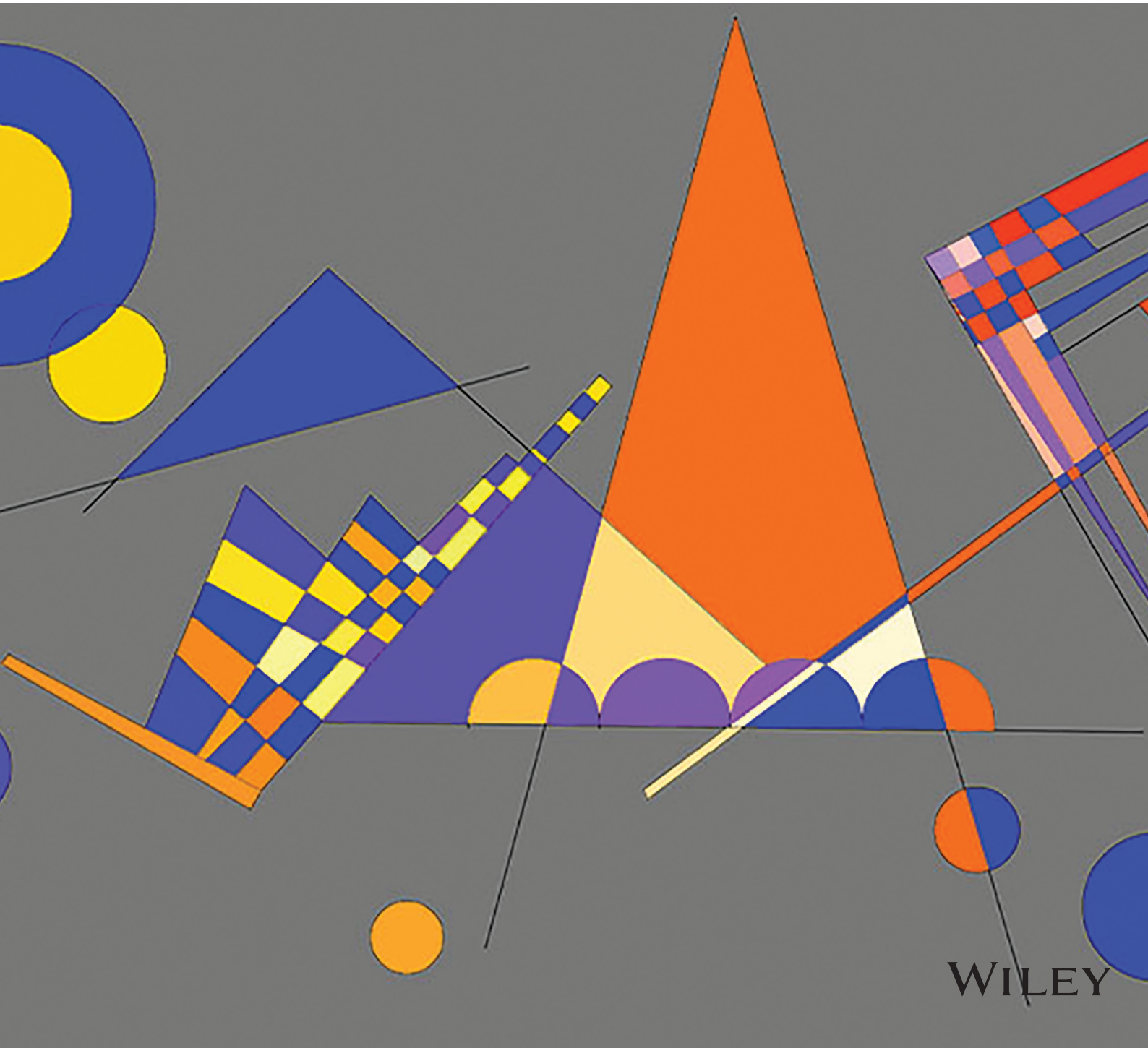
COLOR

RESEARCH AND APPLICATION



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RESEARCH ARTICLE

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Surface characterization of weathered and heat-treated wood-based composites reinforced by styrene maleic anhydride

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Abstract

The aim of this study was to investigate the effect of heat-treated lignocellulosic filler on the surface characteristics and decay resistance of the wood flour/styrene maleic anhydride (SMA) composites. In this study, heat treatment was conducted at 212°C for 8 hours. Test specimens were prepared by injection molding at 220°C. Weathering tests were performed by cycles of UV-light irradiation for 8 hours, water spray for 15 minutes, and then conditioning for 3.45 hours in an accelerated weathering test cycle chamber. Heat-treated wood flour/SMA composites were evaluated for color changes, and attenuated total reflectance Fourier transform infrared (FTIR) spectroscopy was used to analyze chemical changes on the sample surfaces. The wood decay tests were performed of white rot fungus, *Trametes versicolor (L.: Fr.) Pilat* was based on mini-block specimens on 48% malt extract agar in petri dishes. The study showed that color changes occurred when heat-treated filler rate is increased in this material. Therefore, materials in 10% filler rate show lower color changes than other variation. As a result of the FTIR analysis, the addition of wood filler into the SMA causes changes in the chemical structure. In addition, the increase in wood filler reduced the resistance to weathering. Decay results showed that thermally modified wood has lower mass loss caused by fungal attack than untreated wood material. The weight loss decreases with the increase in wood flour rate expect 10%T and 10%UT in all composites.

KEYWORDS

accelerated weathering, decay test, FTIR, heat treatment, wood plastic composite

1 | INTRODUCTION

In recent years, the production of wood plastic composites (WPCs) in the thermoplastic industry is expected to be widespread and continue to grow. In the production of WPCs, biodegradable fibers are preferred as reinforcing fillers and are of interest to manufacturers as environmentally friendly materials.[1-3] WPCs are generally recommended as an alternative to the proper use of solid wastes for recycling. These composites, especially used in outdoor applications, have UV rays and biodegradable properties. In addition, the material contains thermal stability, moisture resistance, fungal resistance, and UV stability.[4,5]

WPC materials are highly resistant to fungal attack. Wood is a bio-based material that is sensitive to biological degradation of wood in WPCs. It is known that due to the biological degradation, WPCs that include between 30% and 70% of wood particles face fungal attack. Several producers have attempted to make composite products with less water to be used in the indoor environment to minimize the risk of fungi.[6] In addition, it is an unavoidable fact that this wood material has a level of humidity suitable for fungal attack.[7-11]

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