Eligible authors at German institutions may publish open access (OA) and benefit from full reading access to Wiley’s journals

Projekt DEAL and Wiley have partnered to support institutions and researchers to advance open research, drive discovery, and develop and spread knowledge.

- Eligible authors at participating German institutions may publish OA and benefit from full reading access to Wiley’s journals
- Authors from Projekt DEAL institutions may publish primary research and review articles OA in Wiley journals, and retain copyright of their works, at no charge to the author
- All Projekt DEAL institutions have access to read Wiley’s academic journals back to the year 1997

Corresponding authors who submit their work from participating Projekt DEAL institutions may:
- Publish research articles in Wiley gold OA journals without charge to authors (beginning 2019)
- Publish OA in Wiley hybrid journals without an author fee (from 1st July 2019)

For more information and to check eligibility, visit: bit.ly/DEALAuthor

If you have questions on your OA publishing eligibility, reach out to us: cs-openaccess@wiley.com
Surface characterization of weathered and heat-treated wood-based composites reinforced by styrene maleic anhydride

Mustafa Zor\(^1\) | Ahmet Can\(^2\) | Douglas J. Gardner\(^3\)

\(^1\)Design Department, Caycuma Vocational School, University of Bulent Ecevit, Zonguldak, Turkey
\(^2\)Faculty of Forestry, University of Bartin, Bartin, Turkey
\(^3\)School of Forest Resources, Advanced Structures and Composites Center, Orono, Maine

Correspondence
Mustafa Zor, Design Department, Caycuma Vocational School, University of Bulent Ecevit, Zonguldak, Turkey.
Email: mustafa.zor@beun.edu.tr

Funding information
University of Maine; Türkiye Bilimsel ve Teknolojik Araştırma Kurumu

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\(^\circ\)C for 8 hours. Test specimens were prepared by injection molding at 220\(^\circ\)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, \textit{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.\(^7\)\(^-\)\(^11\)