Metallurgical and Materials Engineering

Mechanical and Thermal Properties of Polyurethane-Palm Fronds Ash Composites

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DOI: https://doi.org/10.56801/MME1003

Abstract

The aim of the article is to study the influence of environmentally friendly palm frond ash on the mechanical and thermal properties of polyurethane used as filler. Various weight filler ratios with particle sizes around (125 μm) were examined and characterized using elongation, tensile strength, Young's modulus, compressive strength, average burning time, and infrared spectroscopy. The results showed that the addition of 20 wt.% palm frond ash powder significantly improved the hardness mixture by about 2.83 MPa. In addition to that, the highest value of the compressive strength of the polymer with the additive was recorded at 10 wt.%. Also, the most excellent value of Young's modulus was 2 MPa at a ratio of 50 wt. %, as was the average burning time of about 33 sec. The mechanical properties of polyurethane were affected by adding palm frond ash, which increases the tensile and compressive strengths, making it suitable for use in many applications. Moreover, the environmentally friendly material reflects the benefits of waste recycling. The addition of filler affects the morphology and strengthens the brittleness. Additionally, the use of fly ash from palm frond combustion in the technology of polyurethane materials complies. Partial replacement of

petrochemical components with waste filler also reduces the total energy consumption in producing PU composites.

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How to Cite

Ahmed J. Mohammed, Einas A. Abood, Mahir A. Jalal, and Ibrahim K. Ibrahim. 2023. "Mechanical and Thermal Properties of Polyurethane-Palm Fronds Ash Composites". *Metallurgical and Materials Engineering* 29 (2):24-35. https://doi.org/10.56801/MME1003.

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Issue

Vol. 29 No. 2 (2023)

Section

Materials, Industrial, and Manufacturing Engineering

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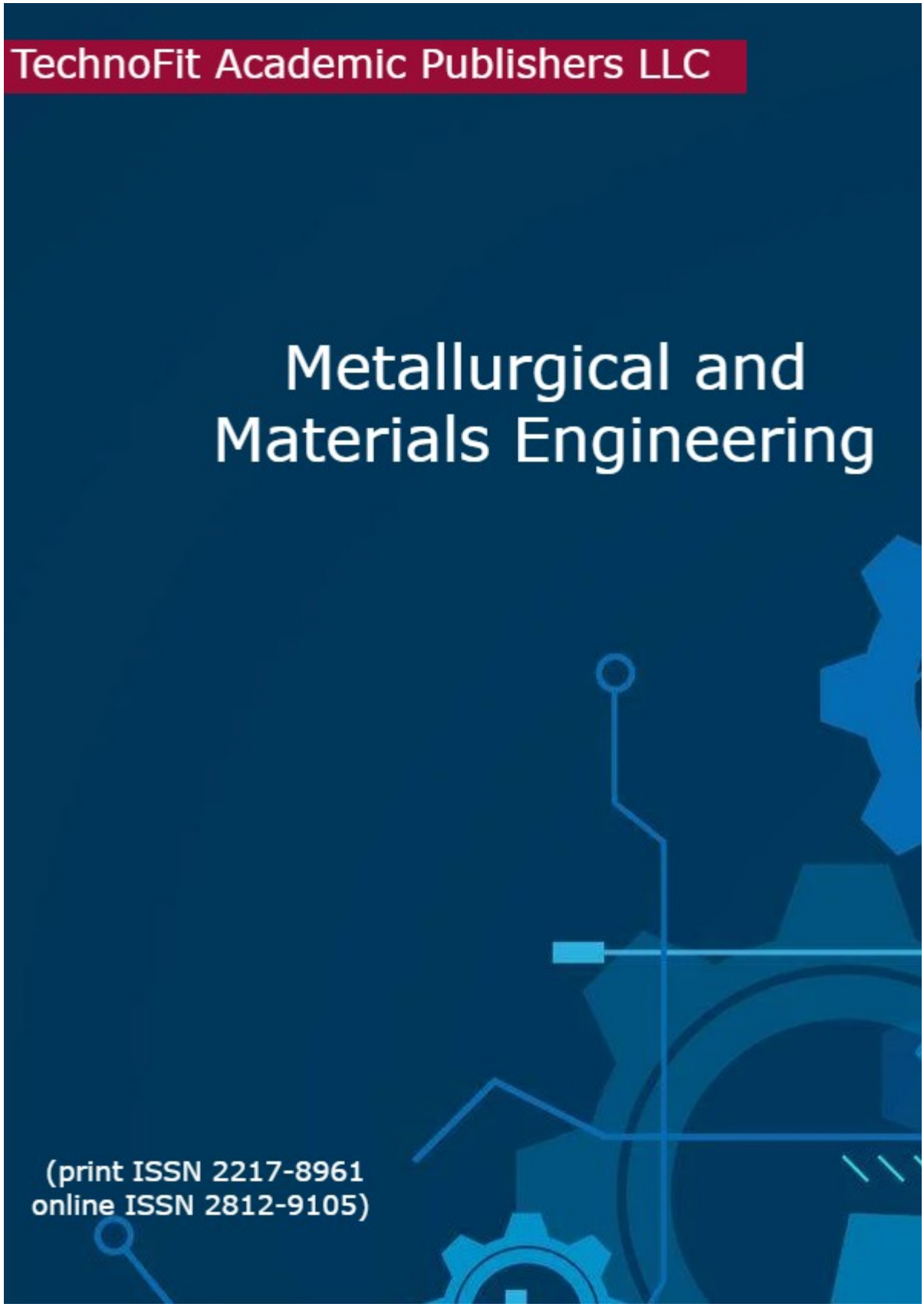
TechnoFit Academic Publishers LLC
Metallurgical and Materials Engineering
(print ISSN 2217-8961
online ISSN 2812-9105)

IF: 0.9

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According to the categorization of Serbian scientific journals in the field of materials and chemical technologies from the 2014 year, the journal Metallurgical and Materials Engineering is in the M24 category.

ISSN (Online) 2812-9105
ISSN (Print) 2217-8961

Publisher:

TechnoFit Academic Publishers LLC,

United States