

## Documents

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**Properties of Kenaf Fibre Filled with Natural Rubber/Thermoplastic Polyurethane Composites**  
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Zulhelmi Ismail  
A. K. M. Asif Iqbal  
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# Intelligent Manufacturing and Mechatronics

Selected Articles from iM3F 2023, 7–8  
August, Pekan, Malaysia

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# Preface

The fourth edition forum of the Innovative Manufacturing, Mechatronics and Materials Forum 2023 (iM3F 2023) organized by Universiti Malaysia Pahang Al-Sultan Abdullah through its Faculty of Manufacturing and Mechatronic Engineering Technology was held on 7 and 8 August 2023. The main field focuses on Manufacturing, Mechatronics as well as Materials.

About 95 submissions were received during iM3F 2023 and were reviewed in a single-blind manner, and 48 papers were advocated by the reviewers to be published in this Springer Proceedings of Materials. The editors would like to express their gratitude to all the authors who submitted their papers. The paper published in this proceeding has been thoroughly reviewed by the appointed technical review committee which consists of various experts in the field of materials and manufacturing engineering.

The conference had brought a new outlook on cutting-edge issues shared through keynote speeches by Assoc. Prof. Ir. Dr. Haji Nik Mohd Zuki Nik Mohamed, Prof. Eng Hwa Yap and Prof. Gian Antonio Susto.

Finally, the editors hope that readers find this volume informative as we thank Springer Proceedings in Materials for undertaking this volume publication. We also would like to thank the conference organization staff and the international program committees' members for their hard work.

Pekan, Pahang, Malaysia  
November 2022

Radhiyah Abd. Aziz  
Zulhelmi Ismail  
A. K. M. Asif Iqbal  
Irfan Ahmed

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# Properties of Kenaf Fibre Filled with Natural Rubber/Thermoplastic Polyurethane Composites

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Nur Amirah Ayuni Jamaludin, [Nurjannah Salim](#) , [Nurul Huda Abu Bakar](#) & [Rasidi Roslan](#)

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## Abstract

Due to their advantages over conventional reinforcement materials, natural fibres have recently attracted the attention of scientists and engineers, and the construction of natural fibre composites has been a topic of interest for several years. The use of natural fibres has enabled the creation of composites that are lighter and less expensive than those presently on the market, such as fiberglass-reinforced polymer composites. This study presents the results of an investigation into the effects of alkaline treatment with sodium hydroxide (NaOH) on the properties of kenaf-filled natural rubber (NR) and thermoplastic polyurethane (TPU) composites. The treated kenaf fiber, TPU, and NR were mixed using a single-screw extruder machine. Three sample preparation ratios were prepared: sample 1 (TPU:200 g), sample 2 (TPU:200 g, NR:10 g), and sample 3 (kenaf:10 g, TPU:200 g, NR:10 g). The samples produced were subjected to tensile and impact tests to determine the stress–strain curve for the percentage of elongation and tensile stress values. Sample 1 was found to have the highest Young's modulus, followed by sample 2. In conclusion, adding natural rubber to kenaf/TPU composites improved their properties of the composites produced.

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