

# Modification of Oil Palm Mesocarp Fiber Characteristics Using Superheated Steam Treatment

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## **Abstract:**

In this study, oil palm mesocarp fiber (OPMF) was treated with superheated steam (SHS) in order to modify its characteristics for biocomposite applications. Treatment was conducted at temperatures 190–230 °C for 1, 2 and 3 h. SHS-treated OPMF was evaluated for its chemical composition, thermal stability, morphology and crystallinity. OPMF treated at 230 °C exhibited lower hemicellulose content (9%) compared to the untreated OPMF (33%). Improved thermal stability of OPMF was found after the SHS treatment. Moreover, SEM and ICP analyses of SHS-treated OPMF showed that silica bodies were removed from OPMF after the SHS treatment. XRD results exhibited that OPMF crystallinity increased after SHS treatment, indicating tougher fiber properties. Hemicellulose removal makes the fiber surface more hydrophobic, whereby silica removal increases the surface roughness of the fiber. Overall, the results obtained herewith suggested that SHS is an effective treatment method for surface modification and subsequently improving the characteristics of the natural fiber. Most importantly, the use of novel, eco-friendly SHS may contribute to the green and sustainable treatment for surface modification of natural fiber.

**Keywords:** oil palm mesocarp fiber (OPMF); silica bodies; superheated steam treatment (SHS); hemicelluloses removal; biocomposite

doi:10.3390/molecules18089132