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## Clay Dispersed Styrene-co-3-Trimethoxy Silyl Propyl Methacrylate Impregnated Kumpang Wood Polymer Nanocomposites: Impact on Mechanical and Morphological Properties

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### Abstract

In this study, the physical, mechanical, and morphological properties of clay dispersed styrene-co-3-trimethoxy silyl propyl methacrylate (ST-co-MSPM) impregnated wood polymer nanocomposite (WPNC) were investigated. The WPNC was characterized by Fourier transform infrared spectroscopy (FT-IR), scanning electron microscopy (SEM), 3-point bending and free-vibration testing. The FT-IR results showed that the absorbance at  $698\text{ cm}^{-1}$  was increased for ST-co-MSPM-clay-WPNC and ST-Clay-WPNC compared with other composites and raw wood. Besides, the hydroxyl group (-OH) was significantly reduced as the strong covalent bond was formed between the -OH groups of wood and the silyl propyl group of 3-trimethoxy silyl propyl methacrylate. The SEM results showed that ST-co-MSPM -clay-WPNC had a smoother surface compared to other nanocomposites and raw wood. The introduction of clay in the WPNC filled the void spaces of the wood and improved the intercalation between the wood and the polymer matrix. The modulus of elasticity (MOE), modulus of rupture (MOR), and dynamic Young's moduli ( $E_d$ ) of WPNCs were considerably increased compare to wood polymer composites (WPCs) and raw wood. The raw wood exhibited a higher water uptake (WU) than WPNCs and WPCs.

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