

A green-modification strategy for high-performance bamboo-based composites via persimmon lacquer and iron ion complexation*

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ABSTRACT: Natural bamboo-based fiber composites offer unique advantages in terms of renewability, eco-friendliness. However, challenges such as dimensional stability, and color stability in outdoor applications remain to be addressed. Here we report a straightforward method to impregnate an oriented bamboo fiber mats with a natural persimmon lacquer solution to fabricate bamboo scrimber composites. Due to the introduction of the complex, the water resistance of bamboo scrimber composite has been significantly enhanced, while having a slight negative effect on mechanical properties. The presence of the complex promoted a denser carbon structure, and the generated metal oxides acted as smoke inhibitors, reducing the total smoke production rate by 62.43%. Additionally, the bamboo scrimber exhibited excellent mildew resistance, hydrophobicity, and color stability, making it suitable for use in outdoor flooring, and furniture. Consequently, the results of this study provide a green processing strategy to prepare high performance bamboo-based fiber composites suitable for outdoor construction and furniture application.

KEYWORDS: Tannic acid; ferric ion; water resistance; flame retardancy; bamboo scrimber composite

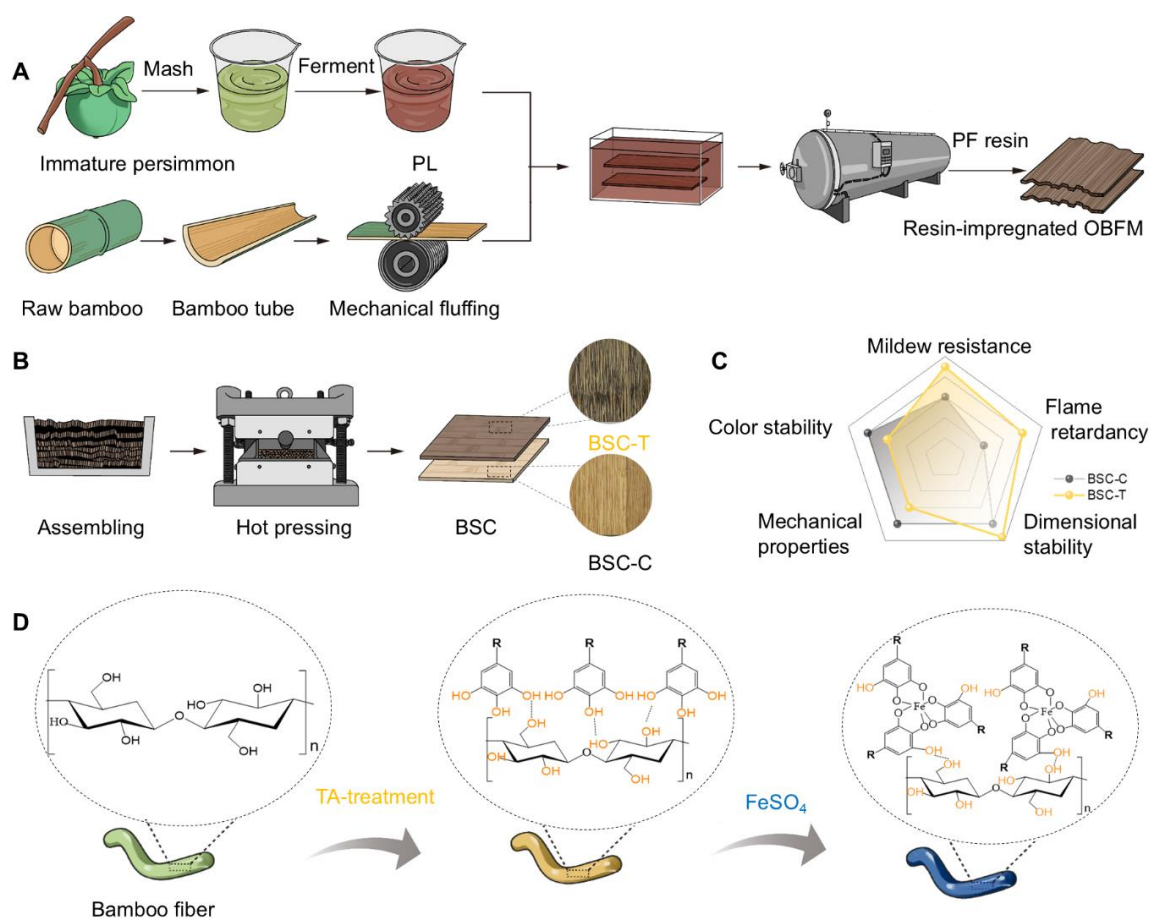


Figure 1. Schematic illustration for preparing modified bamboo scrimber composite.