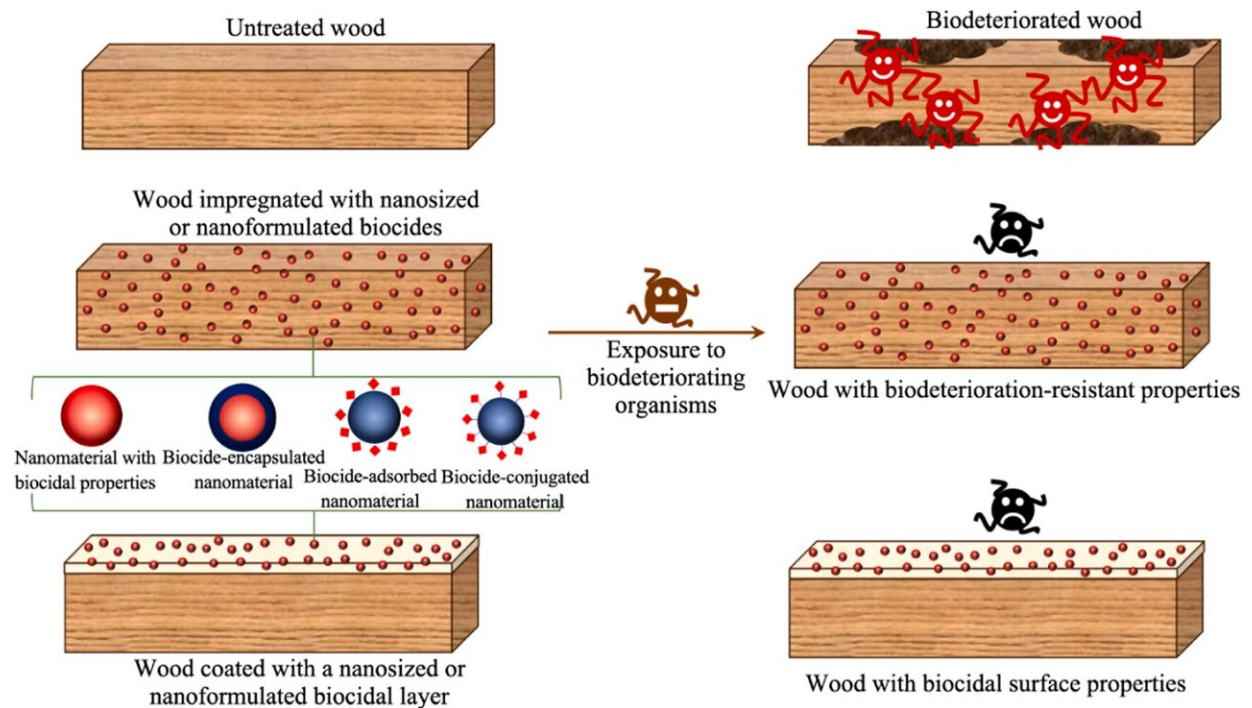


Nanotechnology approaches for creating biodeterioration-resistant wood

December 21 2023



schematic illustration of strategies applied for development of biodeterioration-resistant wood. Credit: Ayyoob Arpanaei a,* , Qiliang Fu a,b, Tripti Singh a a Scion, Private Bag 3020, Rotorua 3046, New Zealand b Co-Innovation Center of Efficient Processing and Utilization of Forest Resources, College of Materials Science and Engineering, Nanjing Forestry University, Nanjing 210037, China

Emerging technologies such as nanotechnology can provide efficient approaches by which new materials with broad functions, such as

durable and fire-retardant properties, can be developed and subsequently used for the treatment of wood materials.

In a [study](#) published in the *Journal of Bioresources and Bioproducts*, an international team from New Zealand (Scion) and China (Northeast Forestry University) report a review that nanotechnology-based methods can be employed to mitigate these weaknesses and create durable, sustainable wood materials.

These wood nanotechnologies also can be employed to develop wood products with antimicrobial surfaces for various applications. Furthermore, analytical tools used in nanoscience and nanotechnology enable the precise study of wood structure and its components on a nanometer scale, particularly those aspects that can affect wood products' biodeterioration resistance properties.

A great deal of advancement has been achieved in the performance of these [analytical tools](#) in recent years. However, even further information on underpinning mechanisms of the biodurability of wood materials can be obtained by employing the pertaining techniques in the study of the physical and chemical characteristics of wood components and the interaction between bio-organisms and wood components in nanometer and molecular levels.

In this review, they present brief information about wood decay organisms and a short explanation of the fundamental mechanisms underpinning the decay phenomena. Conventional methods used for wood treatment to inhibit wood decay and the challenges that these methods usually deal with are briefly described.

Then, in more detail, recent trends in the field of application of nanotechnology-based approaches for the development of wood products with biodeterioration-resistant properties are comprehensively reviewed.

Furthermore, nanotechnology-based methods that have been employed to enhance some other properties of wood materials such as hydrophobicity, dimensional stability, [mechanical strength](#), etc., and simultaneously have shown indirect positive effects on the biodeterioration resistance properties of the resultant wood products are discussed too.

Finally, a future outlook is also provided. The life cycle assessment of the novel nanostructured [wood products](#) will provide a holistic understanding of the environmental implications and safety considerations associated with these products and their manufacturing and end-of-life processes. This endeavor paves the way for the efficient application of [nanotechnology](#)-based methods for industrial manufacturing and the widespread application of biodeterioration-resistant wood materials.

More information: Ayyoob Arpanaei et al, Nanotechnology approaches towards biodeterioration-resistant wood: A review, *Journal of Bioresources and Bioproducts* (2023). [DOI: 10.1016/j.jobab.2023.09.001](#)

Provided by Journal of Bioresources and Bioproducts

Citation: Nanotechnology approaches for creating biodeterioration-resistant wood (2023, December 21) retrieved 28 April 2024 from <https://phys.org/news/2023-12-nanotechnology-approaches-biodeterioration-resistant-wood.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.