



Fully Transparent Coating Allows Mass Timber to Beat the Heat!



WOOD CENTRAL



When exposed to fire, wood not coated with the invisible coating (left) gets burnt and damaged, unlike wood protected by the novel coating's char (right). (Photo Credit: NTU)

A new type of fully transparent coating could help protect exposed timbers from hot blazes – that is according to Singapore's Nanyang Technological University (NTU), which has developed an ultra-thin fire protection shield that can defend mass-engineered timbers from heavy fire.

The new technology has led to the development of a fully transparent fire retardant, now commercialised by Venturer Timberwork, Singapore's foremost mass timber construction partner. It promises to protect elements, including cross-laminated timber and glulam, from intense fire.

“Upon exposure to fire, the coating undergoes a chemical reaction, causing it to expand over 30 times in thickness and form a char layer that insulates the timber beneath from the flames,” according to NTU, *which wrote about the new technology in Pushing Frontiers*. “This versatile coating also applies to other



engineered wood-based products used in the building and construction sector, be it for architectural structures or internal linings, decking and flooring.”



Assoc Prof Aravind Dasari (left) and Dr Dean Seah from NTU's School of Materials Science and Engineering expose wood without coating to a flame. (Photo Credit: NTU)

The new solution builds on the research from *Understanding the influence of melt dripping on UL94 test response in a PA11 system*, published in the Polymer Testing journal. It was led by Associate Professor Aravind Dasari, Associate Chair, and *Dr Dean Seah*, a research fellow from NTU's School of Materials Science and Engineering, who, in partnership with Venturer Timberwork, addressed several industrial challenges:

“Our coating was tested against industry-standard fire classification protocols, and we eschewed the use of halogen-containing additives, known for producing toxic emissions upon combustion,” NTU said, adding that “experimental comparisons between wood treated with our coating and untreated specimens revealed a pronounced reduction in heat release rates and flame spread inhibition with minimal smoke produced.”

“Even a coating of minuscule thickness, comparable to a strand of human hair, achieved excellent ratings under European fire reaction standards for building materials and fulfilled an International Organisation for Standardisation benchmark for product ignitability.”

Wood Central understands that Venturer Timberwork has exclusive rights to the innovation and has already obtained regulatory approval to use it in several

construction projects in Singapore. In addition, Venturer Timberwork has partnered with the Kajima Technical Research Institute to develop coatings for the Japanese market.

“A crucial factor in the scalability of the NTU-developed coating lies in its amenability to factory application, a feasibility rendered by its robust epoxy-based formulation, which distinguishes it from other water-based alternatives,” the researchers said, with a significant European timber manufacturer looking to develop a factory-applied coating.

- To learn more about this technology, *visit NTU's special feature*, an extract from an article that first appeared in NTU's research and innovation magazine, *Pushing Frontiers (issue #23, March 2024)*.

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