NTU scientists invent transparent “fireproof” wood coating

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An invisible coating that can “fireproof” wood has been invented by scientists at Nanyang Technological University, Singapore (NTU Singapore). With the popularity of mass engineered timber growing in the construction industry, one of the biggest challenges for wood is its flammability. When untreated, wood or timber can burn and combust easily.

Over the last decade, mass engineered timber is gaining popularity due to lower costs and faster construction, which sees productivity gains of up to 35 per cent. If the wood is harvested from sustainably managed forests, it also has a lower carbon footprint when compared to steel or concrete buildings.

Current practices to protect the interior of wooden buildings from fires require the use of fire-retardant panels (typically, gypsum and magnesia boards) or the timber has to be coated with paint-like fire-retardant coatings, both of which conceals the natural wood grain of timber.

In comparison, the new invisible coating developed by NTU allows for natural beauty of timber to shine and yet can still provide a flame barrier when “activated” by fire.

Invented by a team led by Associate Professor Aravind Dasari from the NTU School of Materials Science and Engineering, this fireproof coating is just 0.075 millimetres thick and is highly transparent, making it invisible to the naked eye.

When heated up by a hot flame, a series of complex chemical reactions happens, causing the coating to become a char that expands to more than 30 times its original thickness. This char prevents the fire from combusting the wood underneath, as shown in an accredited lab test.

“Most timber or wooden panels only have a transparent coat that protects them from moisture, weather corrosion, termites or pests, and are not designed to withstand high heat. Thus, timber can still burn very quickly, especially if it is unprotected,” explained Assoc Prof Dasari, an expert in fire-retardant materials.

“In our coating, we used technology to lock certain compounds and interact with the resin. They will actively participate in the chemical reactions in a systematic manner when exposed to high heat, thus leading to the formation of char. This char was engineered to be extremely heat-resistant, insulating the wood underneath from the high heat.”