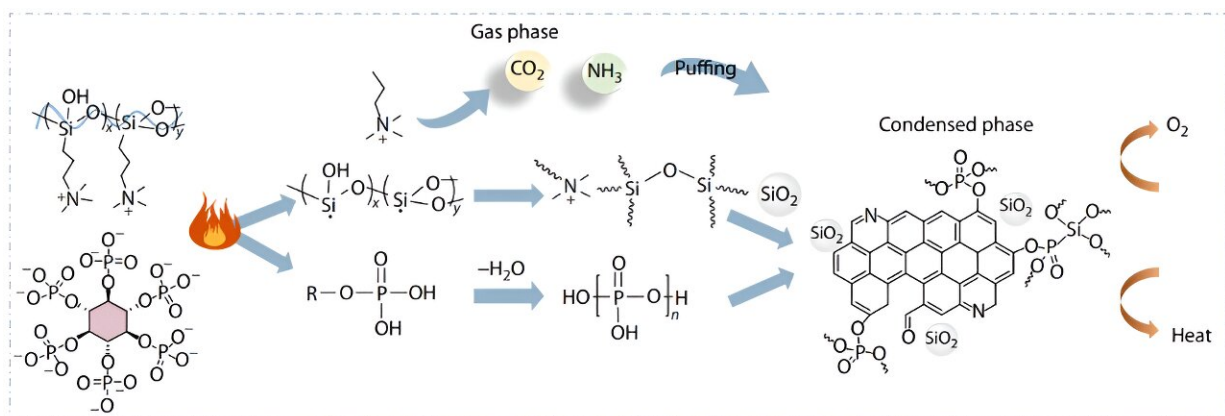


Combining aesthetics with fire-resistance for improved wood protection

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Proposed intumescent flame-retardant mechanism of the P2N2 coating. Credit: *Chinese Journal of Polymer Science* (2024). DOI: 10.1007/s10118-024-3100-1

Wood is a popular material for construction and furniture making due to its availability, easy processing, and strong mechanical properties. However, its flammability poses significant risks, particularly in historical buildings.

Despite progress in flame-retardant technologies, creating coatings that combine [high transparency](#) with fire resistance remains a challenge. These challenges underscore the urgent need for an effective, transparent, and eco-friendly fire-resistant coating for wooden materials.

Researchers from the State Grid Sichuan Electric Power Research Institute and Sichuan University have developed a novel transparent intumescent flame-retardant coating. Their study, [published](#) in the *Chinese Journal of Polymer Science*, introduces a coating that integrates phosphorus, nitrogen, and silicon, creating a synergistic protective layer.

The coating delivers outstanding flame-retardant performance while maintaining the wood's natural appearance, representing a significant leap forward in fire safety technology for wood.

The innovative coating combines phytic acid anion and quaternary ammonium cation to form a cross-linked network that significantly enhances its intumescent properties. This structure boosts the limiting oxygen index (LOI) to 35.5%, making the wood highly resistant to ignition. Additionally, the coating reduces total heat release by 13.9%, effectively slowing the combustion process.

The standout feature is its high transparency, which preserves the wood's natural beauty, making it ideal for historical preservation and aesthetic uses. The robust char layer formed during exposure to fire acts as an effective barrier against heat and oxygen, ensuring comprehensive protection for the wood beneath.

"Balancing fire resistance with material transparency is a key breakthrough in flame-retardant technology. This new coating not only meets stringent safety standards for [wooden structures](#) but also preserves the wood's aesthetic value," said Professor Hai-Bo Zhao, senior researcher from Sichuan University. "This development has significant potential for heritage conservation and protecting culturally important sites."

This newly developed coating provides a practical, sustainable solution for enhancing the fire resistance of wooden materials, particularly in

historical buildings and valuable furniture. Its applications go beyond [fire](#) safety, potentially playing a critical role in preserving ancient architecture and cultural heritage. By combining [high performance](#) with environmental responsibility, this [coating](#) could set a new standard in wood protection.

More information: Xiao-Liang Zeng et al, Highly Transparent Fire-resistant Coatings with Intumescent Three-source Integration, *Chinese Journal of Polymer Science* (2024). [DOI: 10.1007/s10118-024-3100-1](https://doi.org/10.1007/s10118-024-3100-1)

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