



Spectrophotometric analysis could help researchers optimize the performance of transparent wood. Image Source: Unsplash user Sebastian Engler

Wood has been prized as a building material for thousands of years. Strong, pliable, and economical, wood has been an integral part of everything from the most modest of homes to some of the most impressive examples of architectural talent ever created. But wood has several drawbacks: it rots, it blocks light, and it serves as a tasty meal for a number of critters. But now, scientists are opening up new possibilities of construction by creating transparent wood that corrects for many of these shortcomings. And spectrophotometric analysis will play an integral role in making the most of this revolutionary new material, helping us realize the potential of transparent wood for homes and buildings.

#### How Transparent Wood Is Made

Transparent wood is made by first removing the lignin—the material [responsible for the yellowish color of wood](#)—via chemical processes similar to that used in [paper manufacturing](#). “When the lignin is removed, the wood becomes beautifully white. But because wood isn’t naturally transparent, we achieve that effect with some nanoscale tailoring,” says Lars Berglund of the Wallenberg Wood Science Center at Stockholm’s KTH Royal Institute of Technology.<sup>1</sup> This tailoring takes the form of epoxy injections into the channels, or veins, of the wood. “The tiny fibers that form the walls of channels are what makes wood so robust,” says Dr. Liangbing Hu, a researcher at the University of Maryland. “We don’t disturb these channels—and so for the first time, we can maintain the backbone structure of the wood, and make it transparent, while simultaneously making it stronger.”<sup>2</sup> The result is a product that is not only transparent, but more resilient than traditional wood and, with the right engineering, could be even stronger than steel.

#### Why Transparent Wood Matters

Transparent wood isn’t just a novelty item. In fact, it could revolutionize the construction industry by allowing for the creation of more energy efficient buildings. Because wood offers [significantly better thermal insulation than glass](#), transparent wood could help keep houses cooler in the summer and warmer in the winter while still allowing light to stream in, reducing the need for artificial light,

heating, and cooling. Simultaneously, the material could replace less eco-friendly options due to its new optical and structural qualities. “Wood is by far the most used bio-based material in buildings,” says Berglund. “It’s attractive that the material comes from renewable sources. It also offers excellent mechanical properties, including strength, toughness, low density and low thermal conductivity.”

Perhaps the most important feature of the new wood, however, is its potential use in solar cells, which is made possible by the fact that the new wood is transparent, but not clear. The excellent transmittance qualities and optical haze of the material afforded by its epoxy filling could be harnessed to enhance solar cell performance, increasing energy production and decreasing dependence on scarce natural resources. “If you place the transparent wood in front of a solar cell, the amount of light absorbed will be higher, and efficiency can increase up to 30%,” Hu explains.

At a time when residences account for 27% of global energy consumption and 17% of carbon dioxide emissions, transparent wood can allow homeowners to take major and meaningful steps to shrink their negative environmental impact.<sup>3</sup>



The light transmission and haze of transparent wood can be used to augment the amount of light available for solar cells, increasing efficiency by up to 30%.

Image Source: Unsplash user Asia Chang

### Spectrophotometric Transmittance Measurement Can Help Realize the Potential of Transparent Wood for Homes and Buildings

If transparent wood enters the mainstream marketplace, aesthetic considerations will be a top priority for consumers; how does the wood look and is it consistent? Transmittance spectrophotometers will play an integral part in monitoring [both the color and appearance](#) of transparent wood products for commercial and residential use, ensuring optical consistency and helping manufacturers create visually appealing products.

However, spectrophotometric analysis also goes beyond pure aesthetic assessment; by [measuring light transmission and haze](#), researchers can modulate how light enters and is trapped by the material for superior solar cell performance by taking full advantage of the epoxy’s refractive qualities. Using a spectrophotometer such as the new [HunterLab Vista](#), which measures both transmitted color and haze simultaneously, will allow scientists to easily capture the critical

information they need to optimize formulation and evaluate process variables. The insight provided by spectrophotometric instrumentation will be an essential part of fully harnessing the potential of this exciting new material and realizing its full ecological benefits.

#### HunterLab Innovation

HunterLab has been at the forefront of spectrophotometric innovation for over 60 years. Today, we offer a comprehensive lineup of portable, benchtop, and inline spectrophotometers that offer the ultimate in color and appearance analysis. By integrating the most modern technologies with user-friendly designs, our customers are able to rapidly obtain accurate and precise reflectance and transmission measurements with ease. [Contact us](#) to learn more about our exciting range of products and world-class customer service and let us help you select the right instrument for your needs.

1. "Wood Windows? Transparent Wood Material Used for Buildings, Solar Cells," March 30, 2016, <https://www.sciencedaily.com/releases/2016/03/160330085735.htm>
2. "The Incredible Possibilities of 'Invisible' Wood," May 23, 2016, <http://www.cnn.com/2016/05/23/architecture/clear-wood-architecture/>
3. "'Transparent Wood' Could Clear Up Some Big Environmental Problems," March 31, 2016, [http://www.huffingtonpost.com/entry/transparent-wood\\_us\\_56fd3c14e4b0daf53ae8e6](http://www.huffingtonpost.com/entry/transparent-wood_us_56fd3c14e4b0daf53ae8e6)