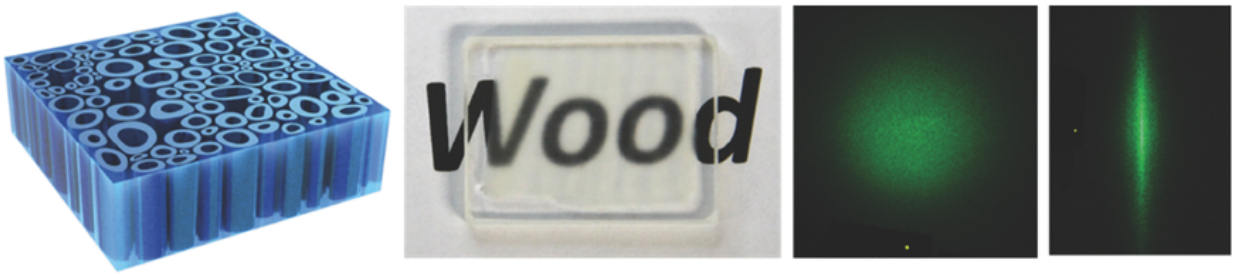
Transparent wood made stronger than glass by applying epoxy

May 19 2016, by Bob Yirka



Credit: *Advanced Materials* (2016). DOI: 10.1002/adma.201600427

(Phys.org)—A team of researchers at the University of Maryland has taken the idea of making wood transparent one better, by making it stronger than glass and thus more useful for a variety of applications. In their paper published in the journal *Advanced Materials*, the team describes the process they have developed for making transparent wood stronger and why they believe it might be useful in solar panel development.

Making wood transparent was already reported last month by a team in Sweden, who found that it could be done by boiling pieces of wood in water, sodium hydroxide and a few other chemicals for approximately two hours to remove the lignin that gives wood its color. Afterwards, they applied a transparent polymer to give the resulting product back some of the resilience it lost when the lignin was removed. In this new

effort, the researchers used approximately the same technique to remove the lignin, but then coated it with an epoxy to make the wood even stronger—stronger they report, than glass (and it is a better insulator), and it will biodegrade much better than plastic.

As the team notes, treating wood does not destroy the channels in it that were originally used by the tree it came from to carry water. After treatment, the channels are able to carry light, a very useful property that might lead to transparent wood being used as a way to funnel more light to solar panels—testing has shown that as much as 90 percent of the light shone on it could pass through. It also means the wood is able to scatter light, which could make it useful as a privacy window—light could come through, but those passing by outside would not be able to make out the forms of people inside.

The researchers believe their product might also prove useful in automobiles, because it is so light, or as building blocks in other applications, or even in optical equipment because it is so inexpensive to make. Before that can happen, though, more work needs to be done, because the current process only works on small pieces of wood—the test material was just five by five inches in area and only a centimeter thick.

More information: Mingwei Zhu et al. Highly Anisotropic, Highly Transparent Wood Composites, *Advanced Materials* (2016). DOI: 10.1002/adma.201600427

Abstract
For the first time, two types of highly anisotropic, highly transparent wood composites are demonstrated by taking advantage of the macro-structures in original wood. These wood composites are highly transparent with a total transmittance up to 90% but exhibit dramatically different optical and mechanical properties.