Colour-neutral and odourless lignin separation method from wheat straw patented

A novel method to extract lignin could help spin wheat straw into gold. Lignin produced using the new method was colour-neutral, odourless and homogenous, an advance that could make this carbon-neutral material a more viable candidate for development of high-value products.

Washington State University researchers extracted up to 93% lignin with up to 98% purity from wheat straw, producing a significant amount of material in a uniform way that could make it more attractive for industry use. This method allows us to extract lignin from plant material in its native form and at a high yield. Lignin is usually separated during papermaking and biorefining, but these processes often contaminate and significantly alter lignin's chemical and physical properties, decreasing its value. So most lignin is either burned to produce fuel and electricity or used in low-value products, such as for cement additives or as a binder in animal feed. Producing a more homogenous lignin provides the opportunity to pursue high-value material development to replace petroleum-derived plastics and polymers.

In their work, the researchers used a solvent to separate the lignin from wheat straw and were able to preserve and control its key properties, producing a more uniform molecule with a consistent molecular weight that makes it more useful for industry. The lignin extracted was light-coloured, which is more like the lignin that exists in nature.

Because it is an electron-rich compound, the lignin had a strong affinity for the solvent, and the electron interactions allowed the researchers to extract it with minimal chemical reactions, which protected its natural molecular structure that is so often easily damaged in chemical separations.

WSU's Office of Commercialization has filed a provisional patent and will assist the researchers for the scale-up and eventual commercialization of this technology. To make it more viable for industry applications, the research team is working to decrease the lengthy processing time and the amount of purification chemicals needed.