

Lignin waste modified for industrial bio-oil use

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Lignin, a waste product in biomass and ethanol production, now finds new value as bio-oil in new products. At the University of Borås, Sweden, a team of researchers has investigated methods to extract and refine lignin for industrial applications.

While the commercial lignocellulose-to-ethanol plants use lignin after pretreatment as biomass feedstock to heat and power plants, in the Horizon 2020 [project](#) AGROinLOG, lignin is instead transformed into bio-oil-based products.

The researcher Swarnima Agnihotri has spent a year at the University of Borås refining the methods to extract the lignin from lignin-rich wheat straw. She says, "If biofuels are to become a reality, we need to realize the industrial potential of lignin and get more value from it. Seeing the complexity and richness of its functional groups, there are various potential applications of lignin by converting it in variety of value added products like high performance carbon fibre, bio-oil and vanillin, to name a few."

The project uses an agricultural residue, wheat straw, which is available in surplus in Sweden, and also in other European countries.

What is there to gain for the society or industry from your part of the project?

Wheat straw lignin valorization will add value to the whole [process](#), and in turn provide benefit to industry, as well as further insight in creating value from lignin, which has been considered a waste until now.

Integration of lignocellulose-based feedstock in ethanol plants is not new. There are a number of techniques already producing ethanol from lignocelluloses at commercial scale.

It is the high investment costs and the low profitability of the process which needs to be

addressed. The goal with this AGROinLOG project will be to see the possibilities of adding a high valuable byproduct, eg. bio-oil, to the whole production chain, and therefore increase the profitability of the process.

What challenges did you face in the project?

Finding a cost-effective biomass fractionation process was a challenge. There is a lot of ongoing research on pretreatment for a better lignin extraction from lignocelluloses, but still the main challenge is to bring the cost down. The results are interesting and motivating.

What is the next step in the project?

Now, when we have optimized an efficient pretreatment process for effective lignin extraction from wheat straw, we will scale up the process, and the pure [lignin](#) obtained will be transformed into bio-oil through a hydrothermal liquefaction process done, that is, extracting liquid and get a concentrated oil. The bio-oil product obtained will be a high valuable byproduct since it can be further upgraded in refineries to obtain green chemicals and biofuels.

Provided by University of Borås

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