HIGH QUALITY LIGNIN FROM WASTE BIOMASS – A CRUCIAL CARBON SOURCE FOR THE FUTURE

The Lixea Dendronic® process, developed from innovative chemistry at Imperial College London, is a highly versatile, cost-efficient, and sustainable biomass fractionation technology. It utilizes low-cost ionic liquids to efficiently separate lignocellulosic materials into pure streams of their main components: cellulose, lignin, and hemicellulose derivatives. The process has been demonstrated at pilot scale at Lixea's plant in Sweden since spring 2022, demonstrating the robust recyclability of the ionic liquid and making significant progress in the product development of both cellulose pulp and lignin. Lixea is now in the pre-engineering phase of building a commercial flagship demonstration plant, called L1X, in central Europe.

In addition to producing high-quality dissolving pulp from the cellulose stream, the Lixea process enables sequential lignin precipitation without added processing costs, yielding tunable lignins with consistent quality across various lignocellulosic feedstocks. Through staged precipitation, high and low molecular weight fractions are obtained, exhibiting clear differences in hydrophobicity and reactivity. The high molecular weight fraction offers a very high carbonization yield, very low impurities, high glass transition temperature (Tg), no odor, and good miscibility with biobased polymers, making it an attractive material for carbonized applications such as activated carbon, hard carbon for batteries, and consumer plastics. The low molecular weight fraction, with its higher reactivity toward resin applications, is well suited for replacing phenolics in glues, adhesives, and thermoset composites.

This presentation will provide an overview of Lixea's latest developments, focusing on the use of cellulose and lignin in renewable materials. With its feedstock flexibility, robustness, and cost efficiency, the Lixea technology has the potential to revolutionize the industry by unlocking vast amounts of previously untapped feedstock sources.

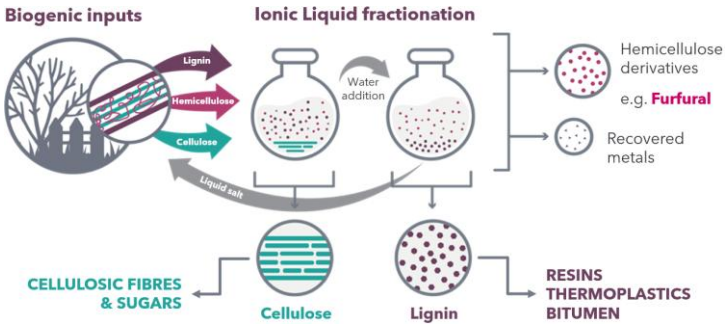

Figure 1 - The Lixea Dendronic process basic outline

Figure 2 – Selected lignin applications. From left to right – Thermoplastics, elastomers, carbon fibre, activated carbon