

“Humins” have revealed great potential as a biobased matrix in composites and building block of elastomer resins with a tunable broad range of mechanical properties. The humins are a side-product produced during the dehydration of biomass-derived carbohydrates, such as the first reaction step of Avantium’s YXY process to convert fructose to the plant-based platform chemical 2,5-furan dicarboxylic acid (FDCA). They are heterogeneous, polydisperse macromolecules with a range of oxygen-containing functionalities including alcohol, ketone and aldehyde groups. Because of this inherent reactivity, humins are capable of undergoing crosslinking reactions at elevated temperatures to form functional thermoset materials. By having replaced fossil based components with humins, products will become more sustainable contributing to establishing a true “circular economy”. Recent studies have included utilizing humins as a thermoset matrix in combination with natural fibres such as jute and hemp to form “all-green” composites and the chemical modification of humins to form elastomeric thermoset resins. This presentation will give an insight into the research that has been performed in these areas, and discuss the key characteristics of the products and possible industrial applications of such materials.