

Humins, a versatile material for all-green thermoset composites

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“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 carbonaceous, heterogeneous, polydisperse macromolecules with a range of oxygen-containing functionalities including alcohol, ketone and aldehyde groups¹. Because of this inherent reactivity, humins are capable of undergoing crosslinking reactions at elevated temperatures to form functional thermoset materials². Although for decades humins have been considered to be a waste product, this attitude is now shifting to focus upon the valorization of humins as a product in its own right that can contribute to establishing a true “circular economy”. Recent studies have included utilizing humins as a thermoset matrix to impregnate natural fibres such as jute and hemp to form “all-green” composites^{3,4} and the chemical modification of humins to form elastomeric thermoset resins^{5,6,7}. This presentation will give an insight into the research that has been performed in these areas, and discuss the possible industrial applications of such materials.

References

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