

Sustainable Material Innovation: Designed Enzymatic Biomaterials

Christian Lenges & Renee Henze

International Flavors and Fragrances – Health & Biosciences

200 Powder Mill Road, E353 – Wilmington DE 19803 USA

Polysaccharides are important biopolymers with a wide range of industrial and consumer product applications. Overall, momentum is building for the transition to inherently more sustainable material choices manufactured in more benign processes but without compromising established product performance. This is driving the continued need for material innovation which is aligned with circular bioeconomy principles and to avoid undesired end-of-life material profiles such as microplastic accumulation. At the same time, new materials need to adopt to existing biorefineries and sustainable agriculture derived from a fungible feedstocks to enable a supply chain that can contribute at industrial scale.

Polysaccharides are a class of natural materials receiving renewed focus given their large design space and rich functionality combined with intrinsic sustainability advantages. Yet, being mostly extracted from natural feedstocks, current polysaccharides in large scale industrial use such as cellulose and starch lack the purity and molecular design precision found in synthetic polymers. Enzymatic polymerization to design polysaccharides is an emerging technology that can address these current limitations while opening access to natural materials with desired sustainability credentials.

IFF has entered into a first commercial phase for this new platform technology and examples across strategic IFF Health and Bioscience markets will be discussed. For example, the robust and consistent performance of cleaning products is critically important; particularly given their relevance and presence in our daily lives. Alongside this need is the increased desire for sustainable materials and the rise in the number of natural and/or bio-based ingredients in the marketplace. Yet, without achieving performance equal to or greater than synthetic materials, natural and bio-based alternatives will not replace incumbent materials nor satisfy customer and consumers' needs.