

Presentation title: *"5-HMF: When a sleeping giant wakes up"*

Company name: Michelin ResiCare (Michelin Group)

Context:

Bio-based molecules respond to a growing societal demand for transparency regarding product composition and their safety for health and the environment. These expectations are driven by international initiatives such as the United Nations' 17 Sustainable Development Goals (SDGs), and more specifically in the chemical sector by Responsible Care for CSR, Safe and Sustainable by Design for new processes, and Together for Sustainability for life cycle assessments.

Abstract:

HMF, or 5-Hydroxymethylfurfural, is an organic compound produced by the dehydration of sugars. It has long been considered a promising biobased building block due to its versatility and potential to replace petroleum-derived chemicals in the production of numerous value-added products. The versatility of 5-HMF is allowed by its molecular structure : the molecule contains a furan ring as well as aldehyde and alcohol functions, which make it a platform molecule towards an infinite number of chemical derivatives and polymers. FDCA, a promising biobased monomer in the production of PEF, is just one of these potentialities. HMF also finds applications in adhesives, coatings, surfactants, pharmaceuticals, and so on and so forth.

The story of our company Michelin ResiCare is a good illustration of the potential of this molecule. In 2008, the Michelin R&D team identified a safer and more sustainable alternative to RFL (Resorcinol Formol Latex) glues which were traditionally used in tire manufacturing. The objective was to stop using formaldehyde and resorcinol due to toxicity and sustainability concerns. We screened and tested dozens of potential substitutes and he concluded that by associating HMF with a specific polyphenol, you could substitute formol and phenols in formo-phenolic resins. We founded Michelin ResiCare in 2016 to exploit these findings. Since then Michelin ResiCare resins have been incorporated in the production of more than 100 million tires and their use is expanding in a wide range of applications such as wood panels or insulation materials. Again here, formaldehyde substitution in phenolic resins is just another example of the many HMF chemical potentialities.

Nevertheless, quite early in the company development, Michelin ResiCare concluded that it needed a large scale, competitive and local source of HMF, which still does not exist as of today. This led to the decision to develop our own HMF production process in partnership with IFPEN in 2018, and more recently to launch our own HMF production plant project. This plant will be located in France and will have a production capacity of several thousand tons of HMF solution.

In accordance with Michelin ResiCare initial objective to get a large scale and competitive source of HMF, we are fully open to collaborate with other industry players in order to scale a biobased and lower carbon material industry.