

Renewable Chemicals into Bio-based Materials: from Lignocellulose to PEF

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The vast majority of chemical building blocks are produced from fossil resources. In the future society there is a need to move to a circular, carbon neutral economy to mitigate the adverse environmental and geopolitical aspects associated with the exploitation of fossil resources. Many chemical building blocks can be produced from biomass, nowadays mainly from 1st generation based carbohydrates [1]. The use of non-edible lignocellulosic feedstocks is an equally attractive source to produce chemical intermediates and an important part of the solution addressing these global issues (Paris targets). In principal, the use of a biorefinery approach to use only part of the lignocellulosic biomass for bioenergy applications further improves both the economics as well as the sustainability of biomass use for bioenergy applications. Biomass chains have to be developed as soon as possible, and can be used for the production of electricity and heat during the construction and starting/upscaling phases [2]. Avantium's strategic objective is to deliver with its 2nd generation Zambezi technology the best in class 2G "pure" glucose technology for (bio-)chemical & bioenergy applications for a sustainable future; in parallel delivering value generation from the implementation of this technology. All products streams should be marketed at their highest value [3].

Avantium Chemicals (www.avantium.com) is an high tech SME company known of their exploration into novel furan (YXY) chemistry, focused on efficient and low cost conversion of C6 sugars via HMF derivatives [4] into the promising chemical key intermediate FDCA. FDCA can be used as building block for a wide range of applications including polyesters such as PEF, polyamides, resins and plasticizers [5]. PEF is a next-generation polyester that offers superior barrier and thermal properties, making it ideal material for the packaging of soft drinks, water, alcoholic beverages, fruit juices, food and non-food products. Therefore PEF is the 100% biobased alternative to PET. Currently, Avantium is working to bring 100% biobased PEF bottles to the market and intends to commercialize the XYX process in a Joint Venture called Synvina together with BASF. In the longer term brand-owners want to have the option to choose between 1st and 2nd generation feedstocks, therefore, Avantium has also developed forementioned Zambezi pretreatment technology to convert 2nd generation feedstocks in a "pure" glucose stream as well as the Mekong project to convert glucose into moneethylenglycol via hydrogenolysis. The potential of electrochemical reduction of CO₂ to building blocks will also be addressed.

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