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***Abstract***

"There is no doubt in my mind that we can only start to change our way of producing and using energy and resources if we develop alternatives that can compete with today’s ways on cost, performance and sustainability." Worldwide plastic production volumes are predicted to grow from 325 million tons per year today to 1100 million tons in 2050. In view of the Paris Agreement CO2 reduction targets during this same period, there is great opportunity for chemistry in the transition that will be required in the decades to come. To make an impact in 2050, these new materials must be identified **NOW** to enable this transition.For this transition, bio-mass and CO2 are the only alternatives for fossil feedstocks. In addition we must switch from single-use to re-use plastics, increase mechanical and chemical recycling and develop re-purpose strategies towards a circular economy. Bio-based versions of molecules that we already use today (drop-in) such as bio ethylene and para-xylene (terephthalic acid) are under development. But is it logical to produce hydrocarbons such as p-xylene (C8; no oxygen) from glucose (C6; more than half its mass oxygen)? As an alternative, should we make use of the structure already present in carbohydrates when developing existing and new monomers? Ethylene glycol and FDCA (furan dicarboxylic acid) are examples that use the functionality present in sugar starting material. In the lecture, the pro’s and con’s of ‘drop-in’ versus ‘new’ will be discussed by evaluating CO2-based monomers and the main routes to bio-PET and to its alternative bio-PEF by zooming in on biomass options, catalysis, analysis and process economics. In addition, new and improved material properties, the required product development and other challenges for a new polymer such as PEF will be highlighted.

***Biography***

Gert-Jan (1963) has a background in Polymer Chemistry at DSM and was Professor of Polymer Catalysis at Eindhoven University of Technology. As CTO of Avantium he developed novel processes for monomers such as FDCA and PEF polyester for bottles, fibers and film. He works on lignocellulosic glucose (2nd generation sugars), on bio ethylene glycol and on the electrochemical reduction of CO2 to chemical building blocks.

Gert-Jan is inventor on more than 100 patents; he was elected “2014 European CTO of the year” and nominated for European inventor of the year in 2017. Gert-Jan is currently also professor Industrial Sustainable Chemistry at the University of Amsterdam.

**Title: The Opportunity of Sustainable Materials**

Photo