



Algemene gegevens	
TKI-Nummer	AF-EU-17020
Titel	Suikers, cellulose en lignine opschaling naar Biobased Building Blocks (SCELIO)
Topsector (A&F of T&U)	A&F (Circular)
Projectleider (onderzoek)	Shanmugam Thiyagarajan (WFBR)
Werkelijke startdatum	01 May 2015
Werkelijke einddatum	31 December 2018
Korte omschrijving inhoud	<p>Activity 4.3: The main aim of this activity is to develop the process technology for the conversion of sugars derived furans into diene and dienophile, which are used in the Diels-Alder reaction to transform further into biobased aromatic compounds. Desired dienes can be obtained by dehydration of sugars via hydrogenation or decarbonylation reactions. Similarly suitable dienophiles can be also derived by selective oxidation/carbonylation reactions starting from sugars. These reactions will be explored further to develop the process technology to derive green building blocks from sugars derived furans.</p> <p>WFBR role in the particular activity is to investigate the efficient synthesis of dienophile "maleic anhydride" from furfural.</p>

uitvoerende partijen	
betrokken kennisinstellingen	WFBR, TNO
overige partijen	Avantium, InSciTe (UM/DSM)

Planning en voortgang	
Loopt het project volgens planning? Indien er wijzigingen zijn t.o.v. de plannen, geef hierop een toelichting. Indien er knelpunten zijn, geef hiervan een korte beschrijving	There are some challenges (cost effectiveness and use of larger volume of H ₂ O ₂) for converting furfural directly (one step) into desired dienophile "maleic anhydride". Alternately two-step strategy is explored for the conversion of furfural to maleic anhydride. In step 1, furfural is converted into stable 5-hydroxy-2-furanone by photochemical reaction. Subsequently the furanone is then oxidized into maleic anhydride in the second step.

Highlights: geef een korte beschrijving van de belangrijkste resultaten (deze beschrijving wordt als publieke samenvatting op de websites van de TKI's/topsectoren geplaatst)
<p>An alternate approach of synthesising maleic anhydride via two-step strategy starting from furfural: The direct oxidation of furfural to maleic anhydride is challenging as it requires large excess of oxidising reagents (for eg. H₂O₂) which is not cost effective. In addition to this, alternative oxidising reagents (catalytic) investigated also generated many side-products due to the high reactivity of furfural. So two-step strategy was proposed. In step 1, furfural is converted into stable 5-hydroxy-2-furanone by photochemical reaction. Subsequently the furanone is then oxidized into maleic anhydride in the second step.</p> <p>As reported in the literature, the oxidation of furfural with singlet oxygen generated via photochemistry was performed. For this reaction three different light sources were investigated. 1) High pressure mercury lamp, 2) using a plant grow LED light and 3) halogen construction lamp.</p>

Among these three different light sources, the set-up with the halogen construction lamp has shown to be successful in the oxidation of furfural to 5-hydroxy-2-furanone. The preliminary results are promising which already shows >65% conversion of furfural by GC-MS analyses. Next step is the isolation of 5-hydroxy-2-furanone and subsequent oxidation to maleic anhydride will be investigated. For the subsequent step, catalytic oxidation (either using Au/C or Pt/C), enzymatic oxidation or electrochemical oxidation is envisioned.

Aantal opgeleverde producten (geef in een bijlage de titels en/of omschrijving van de producten of een link naar de producten op openbare websites)					
Wetenschappelijke artikelen	Rapporten	Artikelen in vakbladen	Inleidingen/workshops/invited lectures	Aangevraagde octrooien/first filings	Spin-offs (*)

(*) Hiermee wordt bedoeld: contractonderzoek dat voortkomt uit dit project, aanvullende subsidies die zijn verkregen en spin-off bedrijvigheid.

Verwacht u het komende jaar een octrooiaanvraag?	nee
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Bijlage: Titels van de producten of een link naar de producten op een openbare website

<https://www.wur.nl/en/project/SCeLiO-4B-Sugars-Cellulose-and-Lignin-upscaling-towards-biobased-building-blocks.htm>

<https://www.stimulus.nl/opzuid/project/scelio-4b-suikers-cellulose-en-lignine-opscaling-naar-biobased-building-blocks/>

Akkoord: Hans van der Kolk (Topsectorsecretaris)