

# **International Bioenergy and Bioproducts Conference (IBBC 2017)**

Norfolk, Virginia, USA  
7 – 9 November 2017

ISBN: 978-1-5108-5245-7

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2017) by the TAPPI Press  
All rights reserved.

Printed by Curran Associates, Inc. (2018)  
For permission requests, please contact the TAPPI Press



at the address below.

TAPPI Press  
15 Technology Parkway South  
Peachtree Corners, Georgia 30092

Phone: (800) 332-8686  
Fax: (770) 446-6947

[memberconnection@tappi.org](mailto:memberconnection@tappi.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## **SESSION 2: IBBC – RAPID FIRE SHOWCASE**

<b>CREATING A TALENT PIPELINE FOR THE BIOECONOMY IN THE MIDWEST</b> .....	1
<i>Diana Nastasis, Courtney Breckenridge, Jacqueline Pohlman</i>	
<b>LOW ENERGY CATALYTIC ELECTROLYSIS FOR SIMULTANEOUSLY HYDROGEN EVOLUTION AND LIGNIN DEPOLYMERIZATION</b> .....	5
<i>Xu Du, Wei Lieu, Yulin Deng</i>	
<b>DIRECT INK WRITE (DIW) 3D PRINTED TEMPO CELLULOSE NANOFIBER AEROGEL STRUCTURES WITH HIGHLY DEFORMABLE, SHAPE RECOVERABLE AND FUNCTIONALIZABLE PROPERTIES</b> .....	8
<i>Vincent Li, Arie Mulyadi, Conner K. Dunn, Yulin Deng, H. Jerry Qi</i>	
<b>A LIFE CYCLE ASSESSMENT OF TORREFACTION BIOMASS TO DISPLACE THE COAL IN THE ELECTRICITY GENERATION</b> .....	11
<i>Maria Alejandra Herrera, Stephen S. Kelley, Yuan Yao</i>	
<b>GIS BASED ASSESSMENT OF FOREST RESIDUES TO SUPPLY TORREFIED AND DENSIFIED SOLID BIOFUELS TO COAL POWER PLANTS</b> .....	14
<i>Sudhagar Mani &amp; Sebastian Granados</i>	

## **SESSION 3: BIOMASS I**

<b>ECONOMIC FEASIBILITY OF DE-ASHING OF LOW-VALUE FOREST RESIDUES FOR BIOENERGY APPLICATIONS</b> .....	17
<i>Sudhagar Mani</i>	
<b>TMP-BIO PROCESS FOR LIGNOCELLUSIC BIOMASS</b> .....	33
<i>Zhirun Yuan</i>	

## **SESSION 4: BIOMASS TORREFACTION**

<b>OVERVIEW OF INTEGRATED TORREFACTION AND DENSIFICATION TECHNOLOGY</b> .....	46
<i>Sudhagar Mani</i>	
<b>MULTI-OBJECTIVE OPTIMIZATION OF TORREFIED BIOMASS TO DISPLACE COAL IN THE ELECTRICITY GENERATION</b> .....	57
<i>Maria Alejandra Herrera</i>	
<b>TORREFIED BIOMASS SAFETY EVALUATION</b> .....	73
<i>Justin Price</i>	

## **SESSION 5: BIO CASE STUDIES**

<b>RECENT LIGNIN ACTIVITIES AT RISE BIOECONOMY</b> .....	88
<i>Per Tomani</i>	
<b>OPERATIONAL EXPERIENCE FROM TWO COMMERCIAL LIGNOBOOST PLANTS</b> .....	106
<i>Kristin Lindholm</i>	
<b>LIGNIN RECOVERED FROM HOT-WATER EXTRACTS OF ANGIOSPERM-BASED BIOMASS PRODUCED IN 65FT3 DIGESTER</b> .....	119
<i>Aditi Nagardeolekar</i>	

## **SESSION 6: BIOCHEMICALS**

<b>GREENER METHOD FOR TANNIN AND LIGNIN EXTRACTION FROM THE YELLOW BIRCH BARK</b> .....	138
<i>Adrien Faye</i>	
<b>IMAGINE CHEMISTRY</b> .....	155
<i>Danny Haynes</i>	

<b>LIGNIN MAPPING AS A STRATEGY TO ENHANCE VALORISATION.....</b>	<b>163</b>
<i>Olumoye Ajao</i>	

### **SESSION 7: BIOCONVERSION**

<b>A LIGNIN-FIRST APPROACH TO BIOREFINING: UTILIZING FENTON’S REAGENT FOR THE PRODUCTION OF PHENOLICS AND SUGARS .....</b>	<b>177</b>
<i>William Joe Sagues</i>	
<b>STRAIGHT CARBONISATION OF SPRAY DRIED SPENT LIQUORS FROM WOOD PULPING .....</b>	<b>190</b>
<i>Janea Köehnke</i>	
<b>ALKYL XYLOSIDES DECOMPOSITION IN SO<sub>2</sub>-ALCOHOL-WATER (SEW) SPENT LIQUORS FOR SOLVENT RECOVERY .....</b>	<b>205</b>
<i>Adriaan Van Heiningen</i>	

### **SESSION 8: BIOPROJECTS**

<b>BRANDS AND BIOREFINERIES: DRIVING VALUE IN BIO-BASED PRODUCTS .....</b>	<b>217</b>
<i>Timothy Staub</i>	
<b>CREATIVE US AND INTERNATIONAL DEBT AND EQUITY FUNDING MECHANISMS FOR BIOECONOMY TECHNOLOGY COMPANIES AND PROJECTS.....</b>	<b>226</b>
<i>Mark Riedy</i>	

### **POSTERS**

<b>CREATING A TALENT PIPELINE FOR THE BIOECONOMY IN THE MIDWEST.....</b>	<b>282</b>
<i>Diana Nastasis, Courtney Breckenridge, Jacqueline Pohlman</i>	
<b>LIGNIN TO CHEMICALS AND HYDROGEN.....</b>	<b>283</b>
<i>Xu Du, Wei Lieu, Yulin Deng</i>	
<b>DIRECT INK WRITE (DIW) 3D PRINTED TEMPO CELLULOSE NANOFIBER AEROGEL STRUCTURES WITH HIGHLY DEFORMABLE, SHAPE RECOVERABLE AND FUNCTIONALIZABLE PROPERTIES .....</b>	<b>284</b>
<i>Vincent Li, Arie Mulyadi, Conner K. Dunn, Yulin Deng, H. Jerry Qi</i>	
<b>A LIFE CYCLE ASSESSMENT OF TORREFACTION BIOMASS TO DISPLACE THE COAL IN THE ELECTRICITY GENERATION .....</b>	<b>285</b>
<i>Maria Alejandra Herrera, Stephen S. Kelley, Yuan Yao</i>	
<b>GIS BASED ASSESSMENT OF FOREST RESIDUES TO SUPPLY TORREFIED AND DENSIFIED SOLID BIOFUELS TO COAL POWER PLANTS .....</b>	<b>286</b>
<i>Sudhagar Mani &amp; Sebastian Granados</i>	
<b>Author Index</b>	