BIOTECHNOLOGY *for* A CIRCULAR BIOECONOMY

28 - 29 March 2023 | AFOB-EFB Virtual Conference

Programme and abstract book

Platinum Sponsor

ELSEVIER

Biotechnology for a circular bioeconomy:

carbon capture, waste recycling and mitigation of global warming

TABLE OF CONTENTS

efb | european federation of biotechnology

ELSEVIER

Revalorization of biodegradable polymers to valuable bacterial nanocellulose

Marijana Ponjavic[1], Ramesh P. Babu[2,3], Divya Rajasekaran[2,3], Brana Pantelic[1], Jasmina Nikodinovic-Runic[1]

[1] Institute of Molecular Genetics and Genetic Engineering, University of Belgrade, Serbia

[2] School of Chemistry, Trinity College Dublin, University of Dublin, Ireland

[3] AMBER Centre, Trinity College Dublin, Ireland

Large amounts of polymers are discarded worldwide each year, leading to a significant polymer waste in natural environment. The upcycling has been found as an efficient way to transform polymer waste into high-value biomaterials meeting the conditions required for circularity by being indefinitely recyclable, without reduction in value or usability. The presented study refers to the upcycling of commercial biopolymers into bacterial nanocellulose. Polymer blends, consisted of biodegradable polymers, such as poly(lactic acid), PLA, poly(butylene succinate), PBS, and poly(*ε*-caprolactone), PCL. Polymers were hydrolyzed and the obtained hydrolysates were investigated as potential carbon source for *K. medellinensis* ID13488 growth and nanocellulose production. Degradation products were analyzed using HPLC analysis. Different growth media, including tap water, HS medium, absence / presence of glucose, were tested and bacterial nanocellulose growth was confirmed under the most of the tested conditions. Once the BNC growth was set up, the BNC production was scaled up and the obtained material was investigated in terms of structure confirmation (FTIR analysis), thermal properties (DSC/TG analysis), morphology (optical microscopy, AFM analysis) and crystallinity (XRD analysis). Finally, the full life cycle of mixed biopolymers: from biodegradation to revalorization of end products into bacterial nanocellulose appeared as perfect model approach to plastic circularity.

Acknowledgment: The authors acknowledge support from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870292 (BioICEP).

efb | european federation of biotechnology

AFOB
Asian Federation
Of Biotechnology