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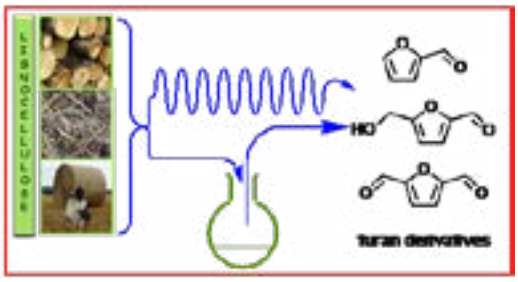
Recent advances in catalytic production of biobased furan derivatives

The design of environmentally friendly methodologies has been the driving force of scientists in recent years. In particular, the use of biomass-derived materials, green solvents and alternatives techniques has been investigated for the production of platform molecules and chemicals such as furfural, hydroxymethylfurfural... Several green chemistry approaches that target advanced synthesis and processes will be presented. All these approaches include the production of (i) furfural and derivatives from D-xylose, xylane and hemicellulose using alternative technologies; (ii) hydroxymethylfurfural and derivatives from D-glucose/D-fructose; (iii) 2,5-diformylfuran from D-fructose. All the process used alternative technologies (eg. microwave irradiation, high temperature/pressure…) in batch and continuous flow via homogeneous and heterogeneous catalysis.[1-8] Conception, synthesis and physico-chemical properties will be detailed.



Scheme 1. Furfural derivatives production in batch and continuous flow.

Recent Publications

1. Verma S, Nasir Baig RB, Nadagouda MN, Len C, Varma RS (2017) Sustainable pathway to furanics from biomass via heterogeneous organo-catalysis. Green Chemistry 19: 164-168.
2. Wang Y, Len T, Huang Y, Tabaoda AD, Boa AN, Ceballos C, Delbecq F, Mackenzie G, Len C (2017) Sulfonated Sporopollenin as an efficient and recyclable heterogeneous catalyst for dehydration of D-xylose and xylan into furfural. ACS Sustainable Chemistry & Engineering 5: 392-398.
3. Le Guenic S, Gergela D, Ceballos C, Delbecq F, Len C (2016) Furfural production from D-xylose and xylan by using stable Nafion NR50 and NaCl in a microwave-assisted biphasic reaction. Molecules 21: 1102-1112.
4. Delbecq F, Wang Y, Len C (2016) Conversion of xylose, xylan and rice husk into furfural via betaine and formic acid mixture as novel homogeneous catalyst in biphasic system by microwave-assisted dehydration. Journal of Molecular Catalysis A: Chemical 423: 520-525.
5. Le Guenic S, Delbecq F, Ceballos C, Len C (2015) Microwave-aided dehydration of D-xylose into furfural by diluted inorganic salts solution in a biphasic system. Journal of Molecular Catalysis A: Chemical 410: 1-7.

Biography

Prof. Dr. Christophe Len became assistant Professor at UPJV in 1997 and was promoted to full Professor in 2004 at the Université de Poitiers (France). In 2010, he moved as full Professor at the Université de Technologie de Compiègne (France). In 2017, he developed his research in Chimie ParisTech (France). He has published almost 150 original publications and review articles, 5 chapters and 8 patents. Among recent awards and recognition to his scientific career, he was promoted Honorary Professor of the University of Hull, England (2012-2018), Honorary Life Fellow of Indian Society of Chemists and Biologists (ISCB, 2014), Fellow of the Association of Carbohydrate Chemists and Technologist of India (ACCTI, 2015) and Fellow of the Royal Society of Chemistry (FRSC, 2015). In 2017, he has been honored with 2017 Glycerine Innovation Award sponsored by the American Cleaning Institute and the National Biodiesel Board. His current research explores organic chemistry and catalysis applied to biomass.

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