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Production of platform chemicals from sustainable exploitation of biomasses

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he focus of the present research is the production of important platform chemicals from sustainable exploitation of biomasses under the perspective of Biorefinery concept. 5-hydroxymethylfurfural (HMF) and levulinic acid (LA) have been classified by the United States Department of Energy as ones of the top-12 promising building blocks, being valuable intermediates for the synthesis of new fuels, solvents, pharmaceuticals and plasticizers. In this scenario, HMF synthesis from fructose and inulin has been investigated in water under microwave irradiation in the presence of homogeneous and heterogeneous catalysts, such as metal salts, niobium and zirconium phosphates or acid resins, identifying reaction conditions as much sustainable as possible. LA synthesis from both raw dedicated biomasses such as arundo donax, miscanthus, pinus pinaster, eucalyptus and waste ones as tobacco chops, poplar sawdust, paper sludge, olive tree pruning, wheat straw, hazelnut shells has been optimized, aiming at a complete circular economy, exploiting all the macro-components of biomass. Moreover, currently, great interest is paid to the production of HMF-based and LAbased derivatives. In this regard, hydrogenation of pure

HMF and biomass-derived HMF to 2,5-bis(hydroxymethyl) furan and 2,5-bis(hydroxymethyl)tetrahydro furan has been performed in water employing commercial Ru, Pd and Pt supported catalysts in batch and continuous process. On the other hand, as concerns LA, crude mixtures of LA and formic acid obtained after the acid treatment of eucalyptus were hydrogenated with commercial Ru/C to x-valerolactone (GVL), allowing high yield to the target product adopting a real cascade approach, without any neutralization or extraction step.



Biography

Claudia Antonetti is an Associate Professor of Industrial Chemistry. She has taken her master degree cum laude at University of Pisa in 2006 and received her PhD cum laude at Scuola Normale Superiore (Pisa) in 2010. In 2015, she has received the certificate of Post-graduate Course (Master) in Bioenergy and Environment. Her research activities concern the applied catalysis and the biomass exploitation under sustainable reaction conditions. She is the co-author of 36 scientific international publications, 1 chapter in international books, 1 patent and 72 communications to international congresses.

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