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CIBIQ2023 - II Ibero-American Congress of Chemical Engineering
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"The global chemical engineering working for a better future world"

CIBIQ PLENARY 2 (Tuesday, June 6th, 11:30-12:30 h)

Auditorium "Dr. Francisco Valsecchi"

"Fibrillated Lignocelluloses and Biomass Residuals as Key Elements to Achieve Circularity"

I introduce three emblematic cases associated with our recent work that highlight the great possibilities of circularity in the bioeconomy based on forest biomass and residuals. First, I discuss a processing route that transforms low-value wood (residual, damaged, decayed, disposed or fractured) into lightweight and strong structural materials. The process involves delignification, combined with partial dissolution and regeneration, to expose cellulose fibrils originally present in the cell walls. The latter form strong hydrogen bonding networks at interphases, leading to a 'healed' wood with a mechanical strength that exceeds that of typical metals and commercial laminated wood. Moreover, recyclability as well as excellent resistance against organic solvents are demonstrated, providing a promising valorization and sustainability pathway for low-value wood (1). Following similar approaches, I next discuss an option for valorization of biomass, in this case, blueberries pruning residuals and food waste and losses, sourced from agro-forestry operations that can be used to produce added-value products, including platform chemicals and value-added materials (2-3). Along such examples, I briefly show the premise of new routes for the production of fibrillated cellulose (4-5). Finally, I given an example of a facile strategy to synthesize all-green SUPs based on chitin nanofibers. The latter are demonstrated for their facile recyclability and biodegradability in natural environments, addressing the limitations of circularity and end of life of non-renewable products (6). Given the low-cost of the raw materials, their natural micro-structural design and self-adhesion, this presentations show fully sustainable alternatives to products based on non-renewable carbon.

Orlando Rojas
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Prof. Orlando Rojas is a Canada Excellence Research Chair in top-ranked University of British Columbia, he is the Director of the Bioproducts Institute . Part of his research group operates in Aalto University, Finland: Bio-based Colloids and Materials. Prof. Rojas is the first Latin-American to receive the Anselme Payen Award, established by the American Chemical Society in 1962, Fellow of the American Chemical Society (2013), the recipient of the Tappi Nanotechnology Award (2015), and the Finnish Academy of Science and Letters (2017). He is an adjunct professor in the Department of Chemical and Biomolecular Engineering of NC State University (USA) and Distinguish Professor in South China University of Technology, Nanjing Forestry University and Dalian Polytechnic University. Prof. Rojas was chair of Aalto's Materials Platform and led a national competence center to advance the Finnish materials bioeconomy, the FinnCERES Flagship. He was co-PI of the Academy of Finland's Center of Excellence in Molecular Engineering of Biosynthetic Hybrid Materials Research, HYBER. His most recent research grants include the prestigious European Research Commission Advanced Grant (ERC-Advanced) and a Horizon H2020 project, among many others.
Orlando Rojas vision: Link
During his career Prof. Rojas has advised 50 postdoctoral fellows, 61 PhD and 45 MS students. He has hosted 110 international visiting scholars and professors. With a h-index of 77 (Google Scholar), he has authored about 470 peer-reviewed papers published in international journals in addition to conference proceedings and other contributions related to the core research, mainly dealing with nanostructures from renewable materials and their utilization in multiphase systems.
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