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puh. 050 577 3736 Sirje Liukko

Press release

Defence on 22 April 2022

Maximizing revenue generation from biomass

Title of the doctoral thesis	Industrial production of colloidal lignin particles and biomass-based platform chemicals
Content of the doctoral thesis	The diminishing trend in the availability of fossil fuels coupled with their harmful impact on the environment has led to the need for more research to find alternative sources which are not only renewable but also sustainable. As such, biomass is one such resource which is renewable and abundantly available and has been further identified and demonstrated as an abundant renewable resource to produce biofuels, platform chemicals, and their respective value-added products. Lignocellulosic biomass is pre-dominantly comprised of lignin, cellulose, and hemicellulose and to consider biomass as a source for revenue generation, it is very essential to ensure the complete utilization of its components. The ultimate goal of this doctoral research was to develop sustainable, techno-economically feasible processes to produce valuable products from biomass. The key findings of the dissertation were as follows: (1) A novel process was developed for the economical industrial-scale production of colloidal lignin particles (CLPs) (2) A novel tubular reactor containing static mixing elements was designed and developed for the continuous processing of colloidal lignin particles. The tubular reactor produced CLPs with uniform particle size, good stability and enabled easy industrial scalabilty; (3) The techno-economics of furfural production from birch hydolysate liquor was investigated and biomass derived furfural could be manufactured at a competitive market price (4) An integrated biorefinery concept was conceptualized and developed to produce multiple platform chemicals such as GVL, 2-MTHF and 5-HMF from lignocellulosic biomass (spruce). The process concept was energy efficient and environmentally sustainable.
Field of the doctoral thesis	Plant design
Doctoral candidate and contact information	M.Sc. (Tech.) Rahul Prasad Bangalore Ashok rahul.bangaloreashok@aalto.fi
Defence date and time	22 April 2022 at 12 o'clock
Remote defence	https://aalto.zoom.us/j/66920855239
Place of defence	Aalto University School of Chemical Engineering, Lecture hall Ke2 (Komppa-Sali), Kemistintie 1, (main door at Biologinkuja) Espoo
Opponent(s)	Professor Riitta Keiski, University of Oulu, Finland Professor Christian Hulteberg, Lund University, Sweden
Custos	Professor Pekka Oinas, Aalto University School of Chemical Engineering
Link to electronic thesis	https://aaltodoc.aalto.fi/handle/123456789/113161
Keywords	Colloidal lignin particles, biomass, platform chemicals, techno-economic assessment, process modeling

Dissertation will be on public display at https://aaltodoc.aalto.fi/doc_public/eonly/riiputus/