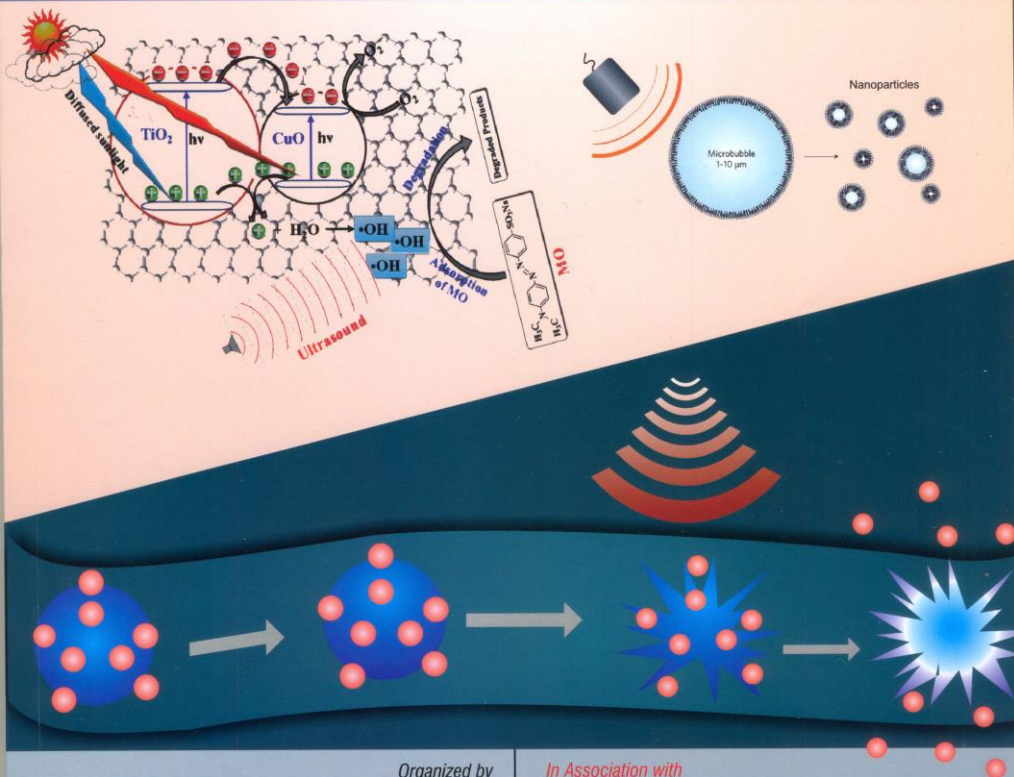


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BOOK OF ABSTRACTS



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Efficient wheat straw delignification under acoustic and hydrodynamic cavitation

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Agro-industry residues generated as wastes during or after processing of agricultural crops are the main resource of lignocellulosic feedstocks available in huge amounts. Delignification is a primary step for further biomass fermentation to biofuels or conversion to fine chemicals. High-intensity ultrasound (US) and hydrodynamic cavitation (HC) have been used as powerful pretreatment for a full valoriza-

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tion of biomass. Due to their peculiar mechanisms, cavitation treatments give effective lignocellulosic matrix disassembling and delignification at low temperature (~45°C). Cavitation also causes decrystallization of cellulose due to partial depolymerization. Within the H₂O₂ project US4GreenChem starting from lab scale investigation, new protocols and equipment features have been designed with the aim to enhance the efficiency of enzymatic hydrolysis of cellulose and lignin recovery. In this work, both US and HC treatments showed to effectively disrupt the lignocellulosic matrix of wheat straw and maximize sugars yields in the following enzymatic hydrolysis performed with improved enzyme pools at Teknologian Tutkimuskeskus (VTI, Finland) and UAB Biocentras (Lithuania). A sequential combined treatment with HC and flow US could reduce the overall treatment time. Preliminary results showed that cavitation pretreatments carried out with suitable equipment and optimized conditions are competitive with classic steam explosion process. US and HC can be easily scaled up enabling loop or flow-mode processes (figure). In view of a biorefinery approach and better understand all the potential applications, a full chemical profile characterization of monomers and oligomers of lignin fraction was performed by UHPLC-ESI-MS/MS method.

 US4GreenChem, grant agreement number 669055, is acknowledged.

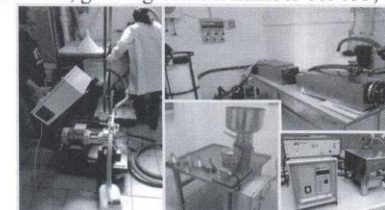


Figure right: multi-frequencies US reactors lab and pilot scale (WEBER Ultrasonics GmbH) left: rotor/stator HC reactor (Rotocav E.PIC srl) central: solid/liquid C3 Separator (ANDRITZ Separation)