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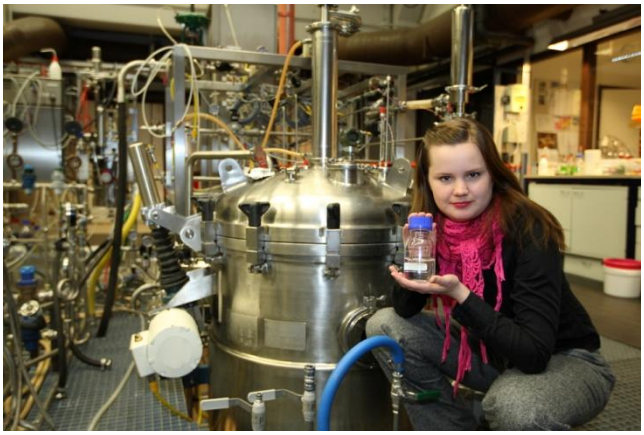

Factors affecting the performance of high consistency enzymatic hydrolysis of biomass

I graduated in 2009 from Helsinki University of Technology studying biochemistry and plant design in the Department of Chemical Technology. After some years of summer and part-time work and Master's Thesis in KCL, I started in VTT as a research scientist after graduation and now have started my PhD work with the topic 'Factors affecting the performance of high consistency enzymatic hydrolysis of biomass'. My work relates to the sugar platform concept in the 2nd generation lignocellulose biorefinery. In order to produce biofuels or chemicals from biomass, the fractionation of the main biomass components and the hydrolysis of polysaccharides to monosaccharides have to be achieved. Once the sugars have been liberated from the biomass with hydrolytic enzymes, the sugar platform offers a wide range of possible products through bioconversion with enzymes or microbes.

In order to produce the final product in high concentration to facilitate purification by distillation, filtration and drying etc., the sugar concentration at start has to be high. For this reason it is advantageous to work in as high consistency (low water content) as possible from the start of the process. High consistency processing also reduces the heating or cooling energy needed, allows smaller vessel sizes reducing capital costs and reduces the amount of waste water. However, mixing technology becomes more complicated, and changes in mass transfer and adsorption phenomena as well as increased possibility of inhibition by soluble compounds may affect the enzymes and the hydrolysis efficiency. The objective of my Doctoral Thesis is to improve the understanding of low vs. high consistency enzymatic hydrolysis of lignocellulosics, mainly the effect of the key factors such as enzyme selection, end-product inhibition, inhibition of toxic compounds present in pretreated lignocellulose, biomass structure, mixing and temperature to hydrolysis rate and yield.