

THERMAL DECONSTRUCTION OF CELLULOSE WITH SUBSEQUENT HYDROLYSIS TO FERMENTABLE SUGARS

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Using a Heated Entrained Laminar Isothermal (HELI) reactor, we exploring a novel thermal deconstruction route for production of fermentable sugars from lignocellulosic biomass. We examined the solid phase kinetics associated with thermal cracking of cellulose – the first step in pyrolysis of this polysaccharide. The duration of pyrolysis is precisely controlled by quickly quenching the condensed phase of pyrolysis products. This allows us to evaluate thermal effects during the earliest moments of pyrolysis using a variety of analytical instrumentation techniques. We have found that the anhydro-oligosaccharide intermediates formed during thermal cracking can be readily hydrolyzed to fermentable sugars. This new thermal deconstruction process eliminates many of the shortcomings associated with both conventional physiochemical deconstruction techniques and pyrolytic generation of sugars.