

APPLICATION OF LIGNIN BLOCKERS AND INACTIVE CELLULASE TO UNDERSTAND ENZYMATIC HYDROLYSIS KINETICS OF PRETREATED CELLULOSE

Bin Yang and Charles E. Wyman

Thayer School of Engineering, Dartmouth College
Hanover, NH 03755

Telephone: (603) 646-3193; Fax: (603) 646-2277

E-mail: bin.yang@dartmouth.edu; charles.e.wyman@dartmouth.edu

Cellulase adsorption on cellulose is vital to achieving high yields of glucose from cellulosic biomass by enzymatic hydrolysis processes, with the specific surface area of cellulose available to cellulase a potential determinant of hydrolysis rates and yields. However, it has proved challenging to measure the accessible surface area. Our data on the adsorption of cellulase and other proteins we term lignin blockers on cellulose, lignocious residues, and BSA pretreated substrates show we can selectively block non-specific adsorption of cellulase on lignin in biomass. Then subsequent addition of *T. reesei* CBH1 (Cel7A) mutant 212Q labeled with Alexa Fluor (AF594) provides information on the accessible surface area at operational hydrolysis temperatures (50°C). The initial hydrolysis rate could then be related to the specific surface area measured by this approach for 'real' substrates, leading to a kinetic model to predict the performance of enzymatic hydrolysis of pretreated substrates.