



"Molecular mechanism of cellulose deconstruction during pretreatment of biomass"



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BIO: Lee is one of the Principal Investigators in the \$20M Center for Direct Catalytic Conversion of Biomass to Biofuels (C3Bio), an Energy Frontier Research Center funded by the U.S. Department of Energy, Office of Science. He is presently a Professor in the Department of Electrical & Computer Engineering at Northeastern University in Boston. He has held posts as Senior Scientist and Director in the Biosciences Division at Argonne National Laboratory and as Program Director for the Materials Research Science and Engineering Centers and for the Instrumentation and Instrumentation Development Division of Biological Infrastructure at N.S.F.

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room 129*

Abstract: Lignocellulosic composite in corn stover is a candidate biofuel feedstock of substantial abundance and sustainability. Its utilization is hampered by the recalcitrant nature of the constituent cellulose fibrils to deconstruction. Structural studies (SAXS; WAXS; XFM; SEM) of pretreated corn stover over length scales from microns to Ångstroms indicate that cellulose fibrils follow one of two pathways during pretreatment: (i) Disintegration through the slippage of molecular sheets in the crystalline cellulose fibrils generates amorphous fragments with sufficient flexibility that their glycosidic bonds become susceptible to hydrolytic attack. (ii) Twisting of intact fibrils released from the cell wall matrix by cleavage of hemicellulosic cross-links. Significantly, the twisted fibrils cannot undergo the planar slippage that appears to be an obligate first step in deconstruction suggesting they represent a highly recalcitrant population that exhibits substantial resistance to further digestion.