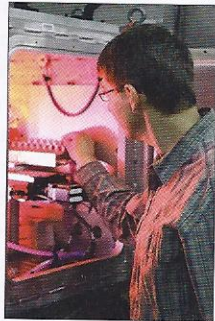


# Inside Switchgrass

## Neutron Research Into Pretreatment Effectiveness

Scientists have discovered new clues as to what happens when switchgrass is subjected to an acid pretreatment process. They believe this knowledge may help shorten the time for switchgrass to become a major feedstock for ethanol production.

Researchers from the Department of Energy's Oak Ridge National Laboratory (ORNL) in Tennessee used small-angle neutron scattering to analyze samples of switchgrass provided by researchers from Georgia Institute of Technology.



Volker Urban

a redistribution process, forming large aggregates or droplets in size.

The study provides the molecular details on how hot dilute sulfuric acid treatment decreases recalcitrance—in effect, making the cellulose more accessible by weakening the biological material's built-in defense system against biochemical degradation.

What does all this mean? Urban said the processes of redistribution of the lignin

and decreased recalcitrance should make the lignocellulose more accessible.

“But,” he continued, “the fact that the crystalline portion becomes thicker may result in a counterproductive side reaction because the common understanding is that the more crystalline the cellulose, the harder it is to digest.”

Switchgrass is generally considered as one of the best biomass candidates for biofuels production because of its high yields, wide adaptability, perennial growth, production of seeds and adaptability to poor soils.

*Del Deterling, contributing writer*

### Neutron Probe

Their objective was to observe the effects of pretreating switchgrass samples with hot dilute sulfuric acid. When samples were probed with a neutron beam, some of the neutrons interacted with the biological materials and scattered at small angles, forming specific signatures.

“From these signatures, we were able to ascertain valuable information of the structure of the biological material,” said Volker S. Urban, staff scientist at ORNL's Chemical Sciences Division (865-576-2578).

The scientists observed that the native switchgrass undergoes significant morphological changes after it is pretreated.

One notable change was that while the switchgrass materials were found to be very similar at scales greater than 1,000 angstroms, the materials were substantially different at shorter lengths studied. In other words, similar to looking into a microscope, the closer the scientists were able to look, the more impact of pretreatment they were able to see.

### Redistribution Process

At the same time, the scientists noted that the lignin portion went through

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