

Chemistry and Analytics of Renewables - Biorefineries and Biomaterial Research

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Analysis, fractionation, separation and isolation of compounds from renewable resources – knowledge of the components on a molecular level is the basis of new biomaterial developments



Universität für Bodenkultur Wien
Department für Chemie



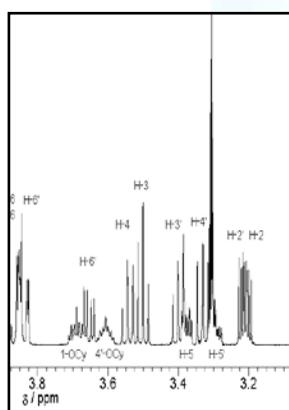
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Biorefineries are the chemical plants of the future



Biorefinery Analytics

In a biorefinery, plants are converted into useful products. These conversions produce very complex compound mixtures. Their understanding requires a combination of modern methods on different instruments to analyze the chemical composition on a molecular level. For their utilization, novel pre-fractionation, separation and concentration approaches are necessary.



Our research division harbors a wide range of latest equipment and long-term experience in tackling the complicated tasks of biorefinery analytics and chemistry.



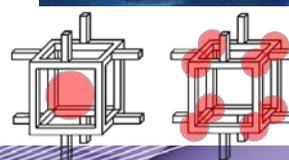
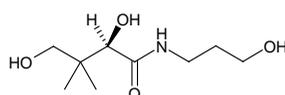
Highly porous, ultra-lightweight cellulose aerogels



Cellulose aerogels are 10 times lighter than commercial styrofoam. The „Pummerin“ bell in Stephansdom would weigh only 13 kg if it was made from cellulose aerogel – instead 22 tons.

Surface-modified, reinforced aerogels are promising light-weight construction and insulation materials.

Cellulose aerogels have a great potential for biomedical applications, such as controlled drug release or cell scaffolds in tissue engineering.



Christian Doppler Laboratory
„Advanced cellulose chemistry and analytics“



Pulp and Paper, Intelligent Fibers, and Lignin Research



Falk Liebner, Markus Bacher, Stefan Böhmendorfer, Elisabeth Lackinger, Karl M. Klinger, Martin Siller, Antje Potthast, Thomas Rosenau*



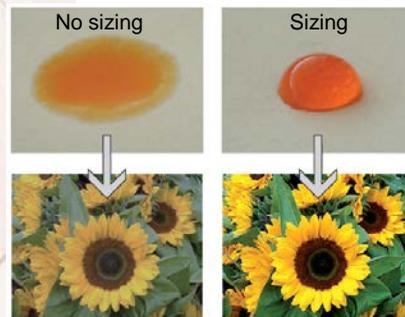
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Cellulose – the organic resource par excellence
Lignin – from waste to valuable chemicals

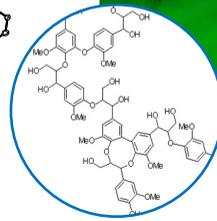
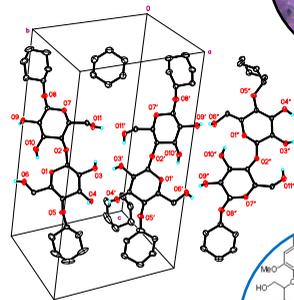
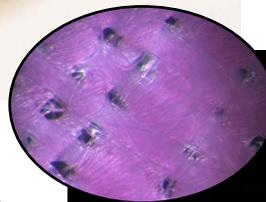


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Pulp & paper - from commodity to high-tech



Novel sizing agents based on sunflower oil instead of petrol render paper an even more sustainable material – at the same quality and costs.



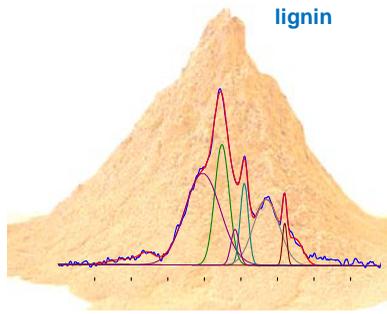
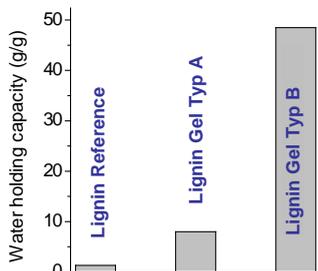
N-modified commercial lignin

Novel concepts of lignin utilization

Nitrogen-modified lignins are high-grade soil improvers and share many similarities with native soil humic substances. They are urgently needed to combat global desertification.



Lignin-based, crosslinked hydrogels can significantly improve the water retention capacity of sandy soils.



Research in our division addresses the whole breadth of cellulose chemistry, covering cellulose in solution (rayon or Tencel fiber production), in gel state (pulp, chemical derivatizations) and in solid state (paper, materials). Intelligent cellulose fibers are conductive, trigger-responsive, solar cell or sensor materials, or have other intriguing properties.



„Future Lignin and Pulp Processing Research“



Conservation science of cellulosic materials



Ute Henniges, Gerhard Banik, Kyujin Ahn, Myung-Joon Jeong, Sonja Schiehser, Thomas Rosenau, Antje Potthast*



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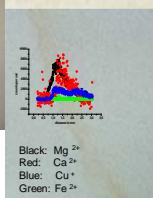
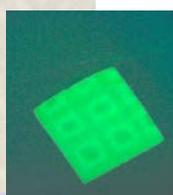
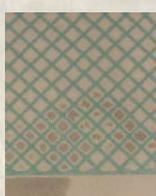
Analysis, evaluation and conservation of art on paper and other cellulosic materials – development of improved treatment solutions



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Analysis enhanced by fluorescence

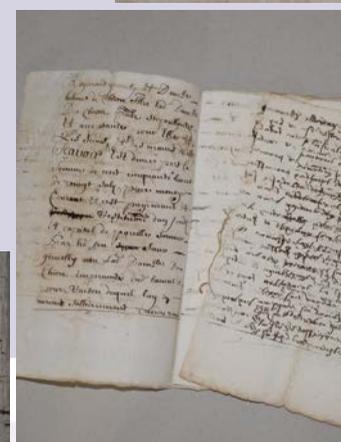
Sometimes, it is difficult to see what really matters. For the analysis of aged and damaged cellulosic materials we often use fluorescence labels to enhance the power of our analytical tools. Changes in the polymeric structure can be visualized and quantified with selective labels to detect oxidation or with laser assisted surface analysis. In addition, molar mass parameters of biopolymers can be linked to material properties.



The beautiful side of material science



Austria's history is written with iron gall ink on paper. It takes the joint activities of everyone in collections, companies and research centres to understand the interaction of paper, ink, and the environment with the aim to develop new ways to preserve our written past. With regard to the attractiveness of the objects, we like to see our work as the beautiful side of material science.



Saving the past for the future



Materials from cellulose have a diverse cultural background. Besides our domestic heritage, we also care for the conservation of textiles from pre-columbian Peru, the very first papers from China, Korea, and Japan, or cellulose from ancient Egypt.

