on the structural features of lignin obtained from straw and bagasse sugarcane were studied using synchrotron small angle X-ray scattering (SAXS). Bagasse and straw were pretreated under three different types of pretretament -hidrothermal, diluted acid and steam explosion. The delignification was carried out by means of either soda pulping or soda/antraquinone processes. Our SAXS study was performed for aqueous solutions containing 5 mg/mL of lignin using the SAXS1 beamline of the Synchrotron Light Laboratory (LNLS), Campinas, Brazil. Data treatment was carried out by using Beaucage model for two structural levels [3].

SAXS results revealed that dilute solutions of both lignins, from bagasse and from straw, are composed of a mixture of colloidal nanoparticles and aggregates. It was observed that the aggregates in solutions of lignins from straw are in general larger than those of lignin from bagasse. The nature of the assymptotic behavior of SAXS curves at high angles allowed us to conclude that, under similar pretreatment and delignification processes, lignin aggregates from straw exhibits a fractal external surface while aggregates of lignin from bagasse shows a mass fractal structure. Our SAXS results also indicated that the diluted acid pretretament promotes a higher fragmentation of the aggregates of lignin from bagasse.

Lignins obtained from steam explosion pretreatment under different conditions of temperature do not exhibit significant changes in the fragmentation effect on aggregates and colloidal particles. The main difference regards the nature of the fractal structure, the aggregates corresponding to lignin pretreated under severe steam explosion exhibiting a fractal surface while those of lignin pretreated under softer conditions a mass fractal structure. SAXS results also indicated that delignification by means of the soda/antraquinone process promotes a lower fragmentation of the aggregates than the process of soda delignification.

Industrial applications as dispersing agent in textile segment or wastewater treatment require the use of highly fragmented lignin. Our SAXS results suggest that lignin produced by acid diluted pretreatment followed by soda pulping delignification would promote a higher yield in industrial processes.

Work supported by FAPESP, Brazil.

[1] *NREL Biomass Research*:http://www.nrel.gov/biomass/biorefinery.htm [2] D. Fengel, G. Wegener, *Wood Chemistry, Ultrastructure, reactions*,Walter de Gruyter, Berlin. **1989** [3] G. Beaucage, T.A. Ulibari, E.P. Black , D.W. Schaefer; *Hybrids Organic-Inorganic Composites* **1995,** *585,* 97-111.

Keywords: characterization, lignin, SAXS

MS04.P03

Acta Cryst. (2011) A**67,** C235

GISAXS with nanoparticles on liquids and with multilayer films on a lab source

Joerg Wiesmann,[a] Bernd Hasse,[a] Carsten Michaelsen,[a] Peter Siffalovic,[b] Karol Vegso,[b] Eva Majkova,[b] Jozef Keckes,[c] Günther Maier,[d] *[a]Incoatec GmbH, Geesthacht (Germany). [b]Inst. of Physics, Slovak Academy of Science, Bratislava (Slovakia). [c]Erich Schmid Inst. of Materials Science, Leoben (Austria). [d]Materials Center, Leoben (Austria).* E-mail: wiesmann@incoatec.de

The method of small angle x-ray scattering enables the investigation of materials in the nanometer scale. It is used for mesoscopic structures like colloids, partially crystalline polymers and other soft-matter samples. For a long time SAXS was mainly developed and used at synchrotrons due to the lack of high brilliance lab-sources. With the introduction of microfocus X-ray sources with high flux densities and low divergence many of useful experiments are now also feasible in the lab-environment, even GISAXS (grazing-incidence SAXS).

In this contribution we show several SAXS measurements with our high brilliance microfocus source IμS for Cu radiation. The beam was collimated with a divergence of only 1mrad and a size of about 0.5mm. The IμS was compared with conventional sealed tubes by measuring standard samples like silver behenate. Multilayer structures of thin films, which were manufactured with different techniques like e-beam evaporation and magnetron sputtering, were investigated with GISAXS in the home-lab and for a comparison at a dedicated synchrotron beamline. Nanoparticles on a liquid sample were investigated with a special GISAXS setup with an IμS and a Pilatus pixel detector. Ordering phenomena could be observed in-situ during an increase of surface pressure. The particles were transformed from single islands to an almost vertically ordered structure of connecting particles.

Keywords: multilayer, SAXS, nanoparticles

MS04.P04

Acta Cryst. (2011) A**67,** C235

SAXS and SANS for the better understanding of polymer processing.

Yoshinobu Nozue,[a] Mitsuhiro Shibayama,[b] Edward B. Coughlin,[c] Julia A. Kornfield,[d] *[a]Petrochemicals Research Laboratory, Sumitomo Chemical Co., Ltd. [b]Institute of Solid State Physics, The Univ. of Tokyo. [c]Department of Polymer Science and Engineering, Univ. of Massachusetts. [d]Division of Chemistry and Chemical Engineering, Caltech.* E-mail: nozue@sc.sumitomo-chem.co.jp

The deeper understanding of the deformation and crystallization behavior of polymer under flow is needed for the better polymer design in industries and we have focused on the researches about polymer deformation. In this talk, we will mainly discuss 'shish-kebab', a highly oriented crystal structure having an excellent mechanical property. We have clarified the role of each molecular weight component of polymer on the formation of shish-kebab structure. Previously, it was believed that the shish is mainly formed by long chains, which is necessary for the effective shish-kebab formation. However, through SANS measurement, it was found that the long chains are not the main component of shish itself and the role of long chains is to recruit surrounding chains into shish [1]. Furthermore, we have found the novel methodology for the effective shish-kebab formation using not long chains but the interaction between inorganic particles. By synchrotron SAXS and WAXD, we observed the shish-kebab formation behavior of polymers copolymerized with inorganic particles during melt drawing and clarified that the shish-kebab formation can be accelerated by controlling the degree of interaction between particles.

[1] S. Kimata, S. Sakurai, Y. Nozue, T. Kasahara, N. Yamaguchi, T. Karino, M. Shibayama, J.A. Kornfield *Science* **2007**, *316,* 1014-1017.

Keywords: polymer, SAXS, SANS

MS04.P05

Acta Cryst. (2011) A**67,** C235-C236

More possibilities of membrane permeation for antimicrobial peptides investigated with biophysical methods

Kuo-Long Lou,[a,b,e] Jia-Nan Jian,[a,f] Po-Tsang Huang,[b,f] San-Tai Shen,[a] Meng-Hsuan Hsieh,[a] U-Ser Jeng,[c] Huey W. Huang,[d] Ming-Tao Lee,[c] *[a]Graduate Institute of Oral Biology, National Taiwan University, Taipei, (Taiwan). [b]Institute of Biochemistry and Molecular Biology, National Taiwan University, Taipei, (Taiwan). [c]National Synchrotron Radiation Research Center, Hsinchu, (Taiwan).*