

Structure Investigation of Lignin-based Polyurethanes using WAXS

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Lignin is one of the most abundant biopolymers and responsible for the strength and structure of plants. Currently, it is accessible in large amounts as a side product of the paper and pulp industry. Lignin is a crosslinked polymer, arising from three phenyl propane derivatives: *p*-hydroxyphenyl, guaiacyl and syringyl with the corresponding precursors are the three aromatic alcohols *p*-coumaryl, coniferyl and sinapyl alcohol [1].

The chemical structure of lignin is depending due on various parameters, e.g. the plant source and pulping process [2]. Due to the high number of hydroxyl groups, lignin is a promising renewable source to replace diols in polyurethane (PU) synthesis. Lignin-based polyurethane coatings were synthesized according to Griffini *et al.* [2].

The lignin-based Polyurethane coatings and commercial polyurethanes were investigated using wide angle X-ray scattering (WAXS). Most, lignin-based PU display only a broad diffraction signal, which is typical for nanocrystalline Polyurethane like thermoplastic polyurethane due to their hard and soft chain segments [3]. In contrast, three sets of lignin-based PU coatings where lignin was precipitated at pH 2 show a remarkable higher degree of crystallinity.

Structure solutions of the synthesized Polyurethane were performed by using different Lignin precursor components.

References

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