SPEAKER

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BIOGRAPHY

2006–2009	Chemistry studies at Technical University of Dresden, Bachelor of Science
2009–2011	Chemistry studies at Technical University of Dresden, Master of Science
2011–2015	PhD in Organic Chemistry (Natural Product Synthesis) with Professor Peter Metz at Technical University of Dresden
2011–2014	Scientific assistant at Technical University of Dresden in the field of Organic Chemistry
2014-2017	Project Manager at Papier-technische Stiftung with research focus on chemical modification of pulp fibres and development of mouldable paper materials
2017-2020	Head of Department Composites & Modification at Papiertech-nische Stiftung with focus on chemical modification of polysaccharides (particularly cellulose pulp) and natural fibre biocomposite materials
Since 2020	Head of Business Division Fibres & Composites at Papiertech-nische Stiftung with focus on fibre and paper-based material development

LECTURE

Martin Zahel, Florian Lull, Michael Panzner, Tom Schilling and Tiemo Arndt

Laser mediated fusing of paper materials

Cellulose is generally not thermally fusible, which excludes the processing of paper in adhesive joining processes such as welding or sealing – as is widely used industrially for plastic films or coatings – without the use of auxiliary materials. However, it was observed by FH Rosenheim[1] that under laser radiation, pressure and shear a plastic deformation, i.e., a melting of cellulose contrary to the widespread assumption is possible. The key mechanism for this was described as the generation of mobility of the individual cellulose molecular chains by chemoselective splitting of hydrogen bonds.

A research project with the aim to use this principle for a paper fusing process “Paper Laser Melting” (IGF 20487 BR) was finished by PTS and Fraunhofer IWS in 2021. The lecture will show results of the carried-out radiation experiments and the induced morphological and chemical material changes in different paper samples as well as results of fusing experiments and mechanistical investigations.

[1] Schroeter, J.; Felix, F.: Melting Cellulose. Cellulose (2005), No. 12, 159-165