SPEAKER

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BIOGRAPHY

Employment

05/2019–present Full Professor for Pulp Fiber Technology
Institute of Bioproducts and Paper Technology
Graz University of Technology
01/2010–07/2019 Assistant Professor and Associate Professor
2016 Associate Professor
2010 Assistant Professor
Graz University of Technology
08/2009–02/2010 Industrial Research
SCA R&D Centre AB Sundsvall, Sweden
07/2000–07/2009 Ph.D. and PostDoc Researcher
Institute of Paper-, Pulp and Fiber Technology
Graz University of Technology
06/1990–09/1998 Software Development (C++, MATLAB, VBA, Oracle SQL)
1998 King Mongkut University, Bangkok, Thailand
1996 Federal Transtel Inc., Atlanta (GA), USA
1990-1996 AVL List, Steyr Fahrzeugtechnik, Elin EBT.

Education

01/2016 Habilitation for Pulp- and Paper Science
Graz University of Technology
06/2006 Ph.D. in Pulp- and Paper Science (magna cum laude)
Graz University of Technology
01/2000 Masters Degree in Mechanical Engineering (magna cum laude)
Graz University of Technology
1990-1993 Psychology, not completed
University of Graz
1985-1987 Pre- Masters Class in Violin, Prof. Kroemer
Graz University of Music and Performing Arts
1981-1989 Secondary School Graz, Austria
Branch of studies: Languages (English, Latin, French)

LECTURE

Evaluating nanoscale contact and adhesion using FRET microscopy

Monica Gaspar-Simoes, Georg Urstöger, and Ulrich Hirn

Several different mechanisms have been found to be responsible for the bonding of pulp fibers. Those are e.g. hydrogen bonding, van der Waals forces and electrostatic interaction (bonding between oppositely charged ions). Among these mechanisms hydrogen bonding and van der Waals attraction only work if molecular contact -- i.e. a distance between surfaces below a few angstrom -- is achieved. Thus, the area of molecular contact between pulp fibers is the most important factor determining the inter-fiber bond strength. In fact, it is a multiplier to all the molecular mechanisms, an increase in contact area leads to a directly proportional increase in bond strength.

FRET (Förster Resonance Energy Transfer) fluorescence is a technique where fluorescence energy between dyes can only be transmitted when the dyes molecules are in close distance in the nanometer range. We are using this technique to quantify the degree of nanoscale contact between polymeric surfaces. For p-Hema thin films we have been able to demonstrate a direct relation between the adhesion force and the adhesion contact area evaluated as FRET intensity. Challenges and results in adapting this method for evaluating molecular contact between cellulosic surfaces are presented and discussed.