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CEITEC – Central European Institute of Technology, Brno University of Technology would like to inform you about the on-coming lecture:

Prof. Lars Berglund

(KTH Royal Inst of Techn, Stockholm, Sweden)

Nanocomposites and nanomaterials from cellulose - combining structural and functional properties

31/1/2017

Tuesday, 13:00

Meeting Room S2.02
CEITEC BUT, Building "S"
Brno, Purkyňova 123

Cellulosic materials such as wood, paper and board are widely used. With the exception of wood, most applications are based on low cost and high production rate of the materials. The cellulose component is in the form of nanofibrils, but its favourable properties and characteristics are most often poorly utilized. In the context of a societal strive towards reduced carbon foot-print, materials recycling and increased use of materials from renewable resources, the potential of cellulose materials is of great interest.

Recently, economical routes have been commercialized for disintegration of cellulose nanofibrils (CNF) from chemical wood pulp. Companies in Japan, Norway, Sweden, Finland and the US are already doing this at industrial scale. CNF can be used as an aqueous suspension and combined with polymers it is of interest in applications such as adhesives, coatings, biocomposites, foams and hydrogels. Research has furthermore showed the potential in multifunctional high-technology applications for aerogels, microelectronic devices, biomedical applications, liquid purification, packaging, magnetic materials etc. In most cases, the role of the cellulose is as a low cost nanofibril providing mechanical function.

As with all nanocomposites, good dispersion of nanocellulose in suspension or in the polymer matrix is essential in order to ripe the full benefits of the CNF properties. Furthermore, the moisture problems associated with cellulose needs to be addressed. The presentation includes strategies for nanostructural control in polymer matrix biocomposites, strategies for removal of the moisture sensitivity, demonstration of the potential of CNF biocomposites in semi-structural applications and in inorganic hybrids with fire retardant characteristics.

Nanocellulose research has inspired new work in the industrially relevant area of pulp fiber biocomposites, where the nanofibrils in the pulp fibers are better utilized. Furthermore, new wood nanotechnology approaches have been developed, where the wood nanostructure is utilized in order to create load-bearing structures with new functions, including optical transparency.

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