



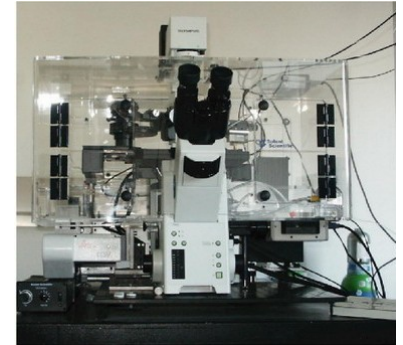
# Experimental and Computational Micro-Characterization Techniques in Wood Mechanics – **COST Action FP0802**

*Nov 2008 - Nov 2012*

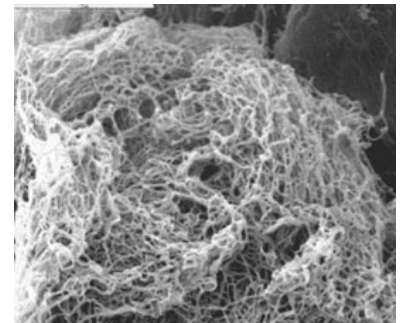
## Main/ primary objectives

Increased understanding of wood microstructure and micromechanics

- by exploring and evaluating emerging techniques in the fields of physics, chemistry, materials and computer science
- in order to provide a strong basis for the development of innovative wood-based products in the future and for enhancing the use of the natural resource wood.



time-resolved scanning acoustic microscope, SASAM (P.V. Zinin)



bio-composites made of cellulose nano-fibers and recombinant resilin; (O. Shoseyov)

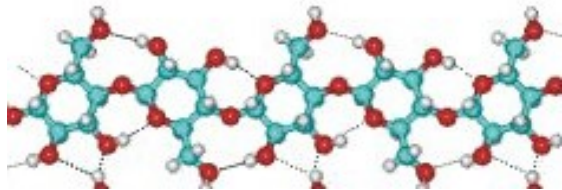
# WG1 – Wood microstructure

Leader: L. Thygesen (DK), Deputy: S. Tschegg (AT)

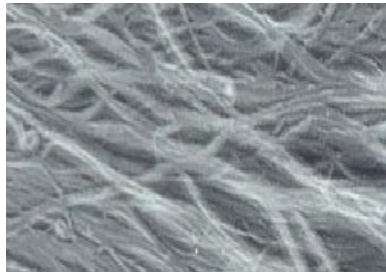
**Topics:** molecular structure of cell wall (incl. bonds), molecular origin of time and moisture dependence of mechanical behaviour

**Methods:** microscopic and spectroscopic methods, X-ray techniques; wood modification and mechanical treatment

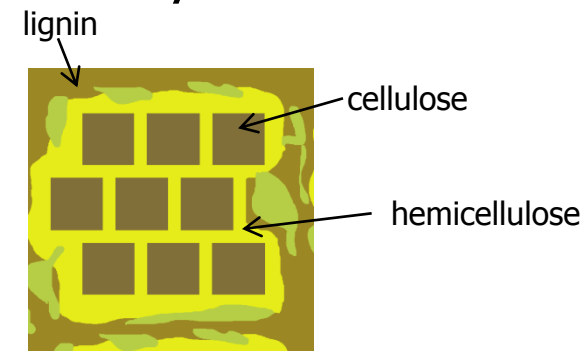
**Deliverables:** deepened understanding of microstructural (molecular) origin of mechanical behaviour, explanatory models



Molecular structure of cellulose  
(Chaplin 07)



Bleached spruce fibre  
(Daniel et al. 07)



Distribution of wood polymers  
(Fahlen & Salmén 05)

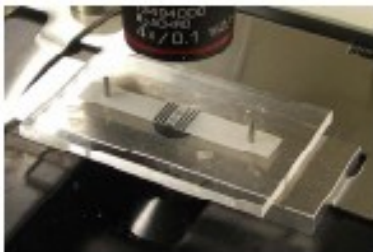
# WG2 – (Hygro-)mechanical properties

Leader: M. Eder (GE), Deputy: O. Arnould (FR)

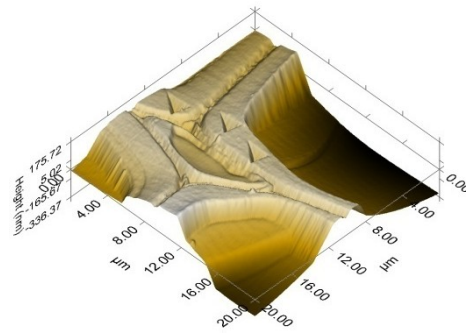
**Topics:** (micro)structure function relationships, hygro-thermo-mechanical properties of cell wall and its components, in-situ tests

**Methods:** micro-tensile testing, DMA, nano-indentation, SAM, NMR, Dynamic Vapour Sorption

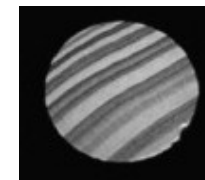
**Deliverables:** hygro-thermo-mechanical properties of wood across several length scales under different environmental conditions



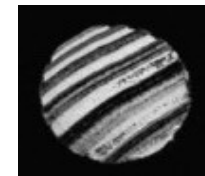
Micro-tensile testing stage and fibre fracture zone  
(Eder *et al.* 07)



Nano-indentations in wood cell wall (Jäger 06)



initial state before pressure application



270 minutes of drainage

NMR images of moisture distribution (Almeida *et al.* 08)

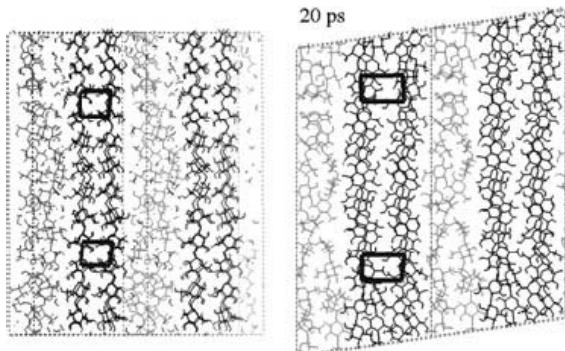
# WG3 – Modelling of the material behaviour

Leader: K. Gamstedt (SE), Deputy: M. Jarvis (UK)

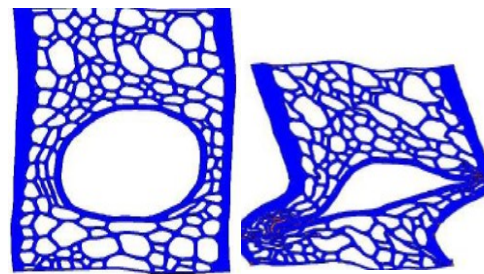
**Topics:** multiscale approaches, hygro-thermo-mechanical couplings, inverse parameter identification, virtual testing

**Methods:** finite element simulations, homogenisation techniques, composite micromechanics, molecular dynamics

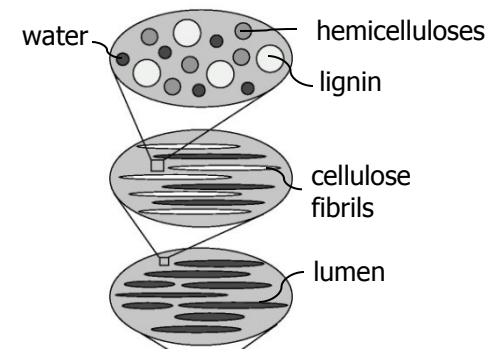
**Deliverables:** predictive integrated computer models for hygro-thermo-mechanical behaviour



Molecular dynamics simulation of simultaneous drying and shearing (*Navi et al. 02*)



Deformation at compressive loading in R-direction (*Ransgri et al. 04*)



Multiscale model for wood (*Hofstetter et al. 05*)

**Participants (by June '09)**

Signatures	MC members
<b>Austria</b>	Karin HOFSTETTER
	Stefanie TSCHEGG
<b>Denmark</b>	Staffan SVENSSON
	Lisbeth THYGESEN
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	Pekka SARANPÄÄ
<b>France</b>	Joseph GRIL
	Patrick PERRE
<b>Germany</b>	Michaele EDER
	Uwe SCHMITT
<b>Hungary</b>	Levente CSOKA
	Ilona PESZLEN
<b>Italy</b>	Marco FIORAVANTI
<b>Lithuania</b>	A. BALTRUSAITIS
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	Jan BRAMMING
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	Edward ROSZYK
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<b>Serbia</b>	Ksenija RADOTIC
<b>Spain</b>	Teresa CUBERES
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<b>Turkey</b>	Ibrahim TUMEN
<b>United Kingdom</b>	Michael JARVIS
	Callum HILL

## Further information

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