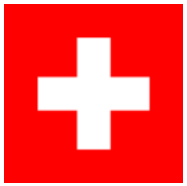
Ongoing R&D projects in COST member countries

January 2014

COST FP1303: Performance of bio-based building materials

Switerland

January 2014



Participating Group 1:
Bern University of applied sciences (**BFH**),
Architecture, Wood and Civil Engineering department
Wood Material and Technology unit (Biel/Bienne)

Participating Group 2:
EMPA: Swiss Federal Laboratories for Materials Science and Technology Development
Team Applied Wood Materials
Group Bio-inspired Wood Materials (Dübendorf)

Interessted to participate Group 3:
University of Fribourg
Adolphe Merkle Institute
Bionanomaterials Group (Fribourg)

Switzerland
BFH - Biel

January 2014

Bern University of Applied Sciences

Ongoing projects :

Topics for WG1:

- NFP66: Nanoparticles for wood preservation (project with Adolf Merkle Institute -> see slide Group 3)
- NFP66: Development of a natural UV-protection of wood surfaces by cellulose-rich layers (project with EMPA)
- COST: Switzerland (Action FP1006) « Bio-modification of wood » with bio-polyesters, vacuum impregnated and further heat treatment in order to improve dimensional stability, durability and surface properties by blocking of the hydroxyl groups of wood.
- Wood-Wisdom: “BioCoPol”: wood chemical modification with different bio-based chemicals like bio-polyesters, tannins, and polyglycerols, combined together to improve selected properties of solid wood, mainly durability. Countries involved : CH, A, F, 2 industrial partners, 4 labs.

Topics for WG2:

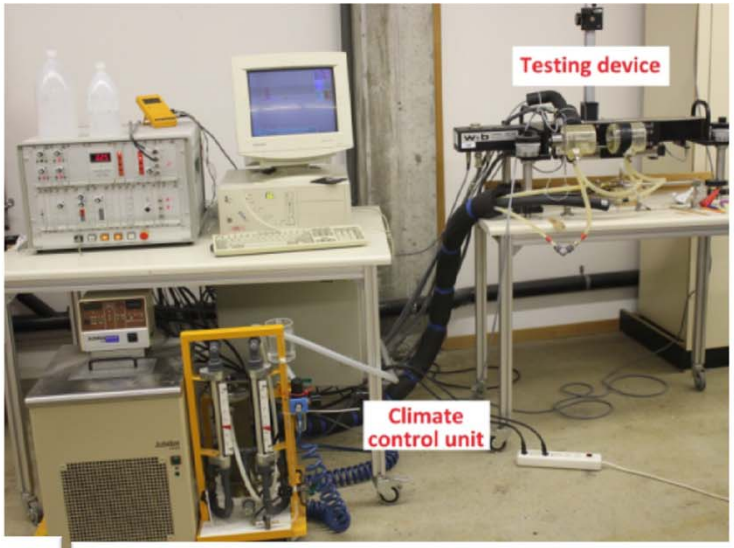
- BAFU: “Sorption behavior of coated wood”; COST Switzerland (submitted): Failure patterns of wood coatings in outdoor applications

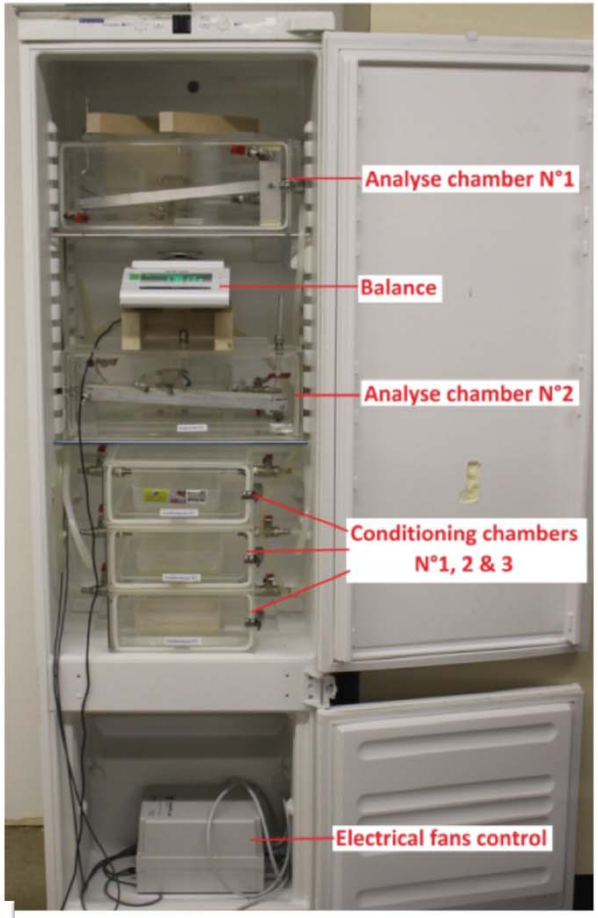
Topics for WG3:

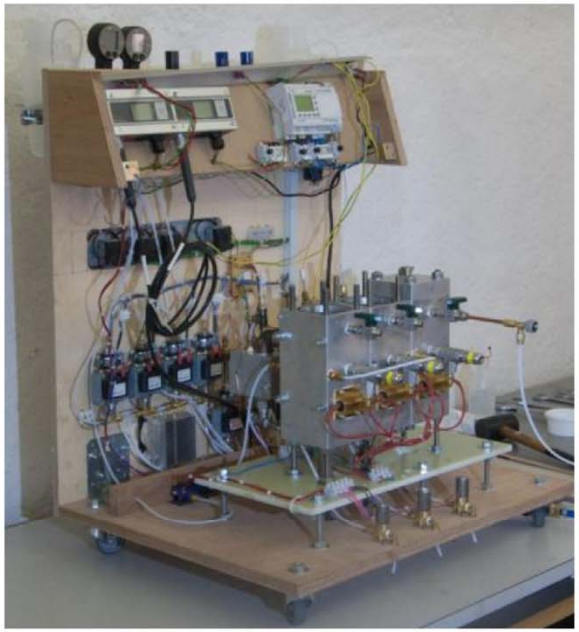
- BFH: “Odour Sens” Identification of Odour relevant compounds in linseed oil based products; COST Switzerland (submitted): Odour neutral linseed oil based products.
- NFP66: LCIA of a Ultralight wood particleboard with bio-based (PLA) foam core produced in 1 step process

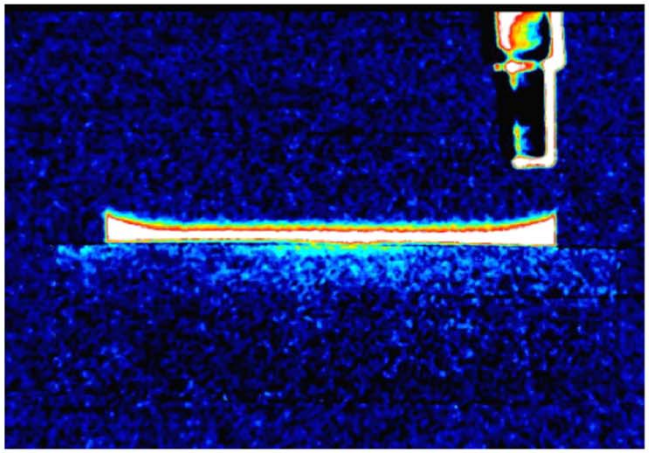
Special equipment and methods:

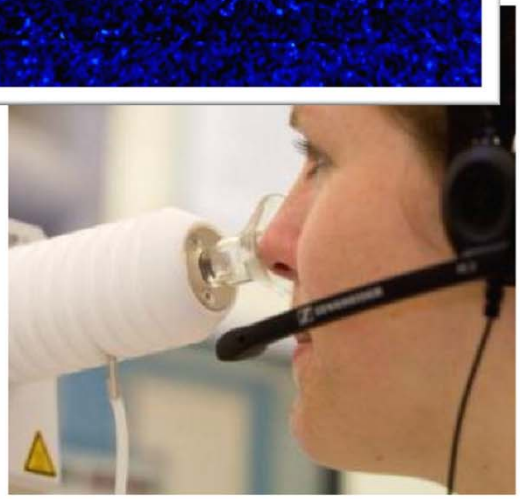
- Special builded reactors for **thermo-hydro treatments (50-150°C; 0-80 % airMC; 1-8 bars)** on macro samples (shown in FP0904)
- **Isothermal sorption chambers** for macro wood samples
- **Micro-mechanical tensile** device with control of T° (20-80°C) and air MC (5-99%)
- Odour identification through GC-MS with Olfactory Detection Port (**ODP**) and trained panel for odour characterization
- Visualisation of the **water transfer** through wood with neutron imaging (collaboration with the Paul Scherrer Institute)
- Fully equiped lab for **chemical characterization** of bio-based compounds and materials + small biology lab + mechanical lab
- **LCIA Software** Aveny with EcoInvent Database


Testing device
Climate control unit

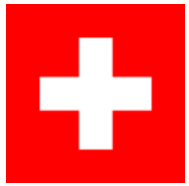

Analyse chamber N°1
Balance
Analyse chamber N°2
Conditioning chambers N°1, 2 & 3
Electrical fans control







cost



Participating Group 2: EMPA

Descriptions of ongoing projects / previous activities
Details of results etc

Specialist equipment

EMPA Materials Science & Technology

January 2014

Dynamic Vapour Sorption (DVS, VTI-SA)
DMTA (TA instruments)

Adolphe Merkle Institute - University of Fribourg - Bionanomaterials Group

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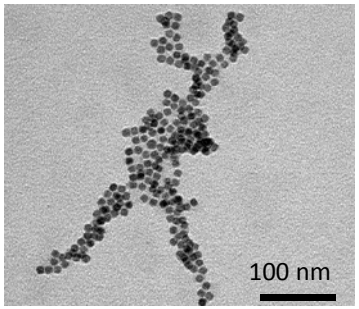
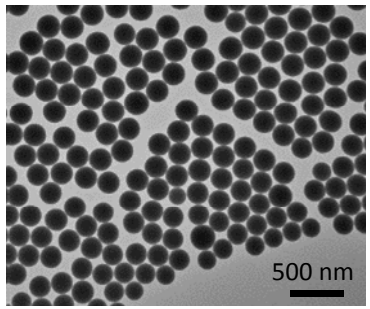
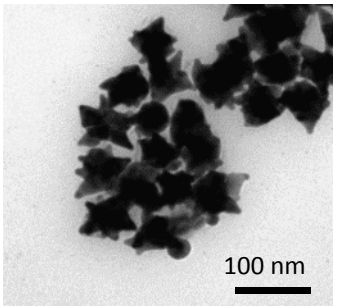
Biocidal Nanoparticles for Wood Preservation

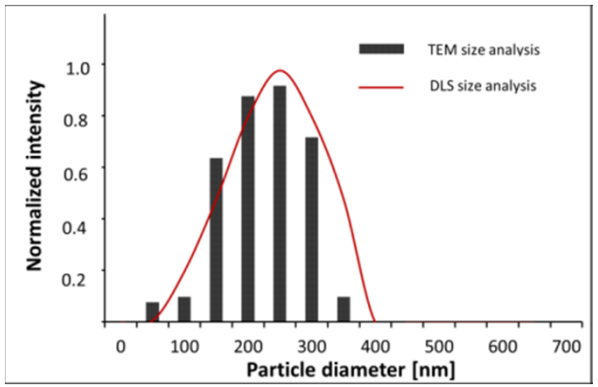
Synthesis and characterization of nanomaterials



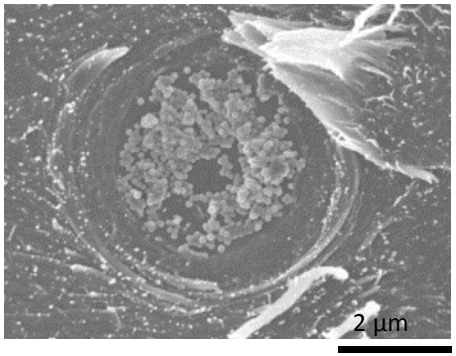




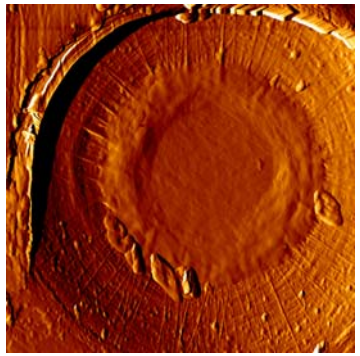
Transmission electron micrographs of nanomaterials of different size, shape and materials.

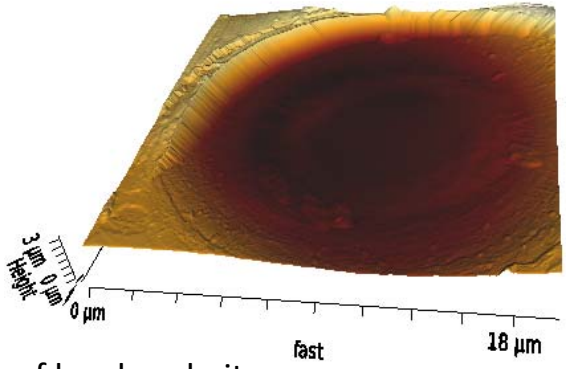


Size analysis by transmission electron microscopy and dynamic light scattering



Scanning electron micrograph of nanoparticles in bordered pit





Atomic force microscopy analysis of bordered pit

Specialist equipment

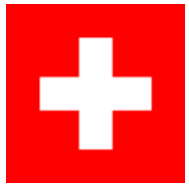
adolphe merkle institute | UNIVERSITY OF FRIBOURG SWITZERLAND
excellence in pure and applied nanoscience

January 2014

- Fully equipped chemistry labs to synthesize small molecules, nanoparticles and polymers in quantities of up to 100g
- Nebulizer for suspensions and controlled deposition of nanoparticles at air-liquid interfaces
- Magnetic reactors for purification and surface derivatization of magnetic nanoparticles
- GPC, GC-MS, IR, NMR
- Fluorescence Spectrometer, UV-Vis, Polarized/Fluorescence, Optical Microscopes, Fluorophotometer and -spectroscopy
- Light scattering (DLS, DDLS, SLS)
- Small-angle X-ray scattering (SAXS)
- Transmission electron microscope
- Scanning electron microscope
- Atomic force microscope
- Tensile tester with temperature chamber
- Elemental analysis (C, H, N, O)
- Cell analysis: PCR, Transepithelial electrical resistance, FACS, comet assay
- Biosafety level 2 labs
- 3D Bioprinter
- Flow cytometer
- BET Surface Area Analyzer

Specialist equipment

September 2013



INSTITUTE	Properties						Environmental				
	Natural Durability	Moisture / sorption studies	Resistance to mould	Fire resistance / reaction to fire	Insect /termites / pests	Dimensional stability	Life Cycle Assessments	Whole Life evaluations	Product accreditation	Emission testing	Environmental Product Declaration (EPD)
BFH AHB, Institue 1	X	X	X			X	X	X		X A*	
Adolf Merkle Inst.											
EMPA		X				X					

X = activity of the group

A = ISO/EN accredited lab

Specialist equipment

September 2013

INSTITUTE	Laboratory tests						Field tests				
	Natural Durability	Mould resistance	Insect /termite testing	Leaching / weathering	Sorption studies	Dimensional stability	In ground contact tests	Out of ground contact tests	Natural weathering	Surface performance / coatings	Moisture data logging
BFH AHB, Institue 1	X	X		X A*	X	X		X	X A	XA	X
Adolf Merkle Inst.											
EMPA				X	X	X			X	X	X

X = activity of the group

A = ISO/EN accredited lab