Book of Abstracts

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„Wood modification research & applications“

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Salzburg University of Applied Sciences
Forest Products Technology & Timber Constructions

in collaboration with
the Society of Wood Science and Technology &
the European Conference on Wood Modification

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Understanding wood modification through an integrated scientific and environmental impact approach (ModWoodLife)

Wood modification research & applications

Third COST Action FP1407 International Conference

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Modified wood with lactic acid oligomers: assessment of performance

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Treatment based on lactic acid has been developed and optimized for wood modification by Noël *et al.* (2009, 2015) and Grosse *et al.* (2016). This treatment aims to improve wood dimensional stability and biological resistance for its usage outdoor. The process consists in oven-dried beech wood (*Fagus sylvatica L.*) impregnation with lactic acid oligomers (OLA), followed by curing in dry conditions.

Treatment efficiency depends on curing conditions and increases with temperature (Grosse *et al*, 2016). At 160°C, treatment conferred very promising properties to wood, in particular regarding anti-swelling efficiency (ASE), moisture exclusion efficiency (MEE) and biological resistance and it was persistent in wood (respectively ASE*, MEE, WL_{CV} and WL_{CP}, and LR in Table 1). Mechanical performance evaluation through 3 points bending test, showed the modified wood was more brittle but could resist higher loads. OLA polycondensation was assessed by Fourier transform infrared (FTIR) spectroscopy (Fig. 1).

In order to evaluate possible up-scaling of this treatment, larger samples were impregnated. Density profile was studied on 100x100x550 mm^3 samples and showed a homogeneous repartition of product in wood. Homogeneity of resistance against fungal decay was assessed with EN113 on samples of 15x25x500 mm^3 (Fig. 2).

Table 1: Results of test.

Treatment	ASE* [%]	MEE [%]	WL_{CV} [%]	WL_{CP} [%]	LR [%]
OLA	61.1 ±3.2	39.4 ±0.7	2.0 ±0.2	2.7 ±0.2	2.3 ±0.2

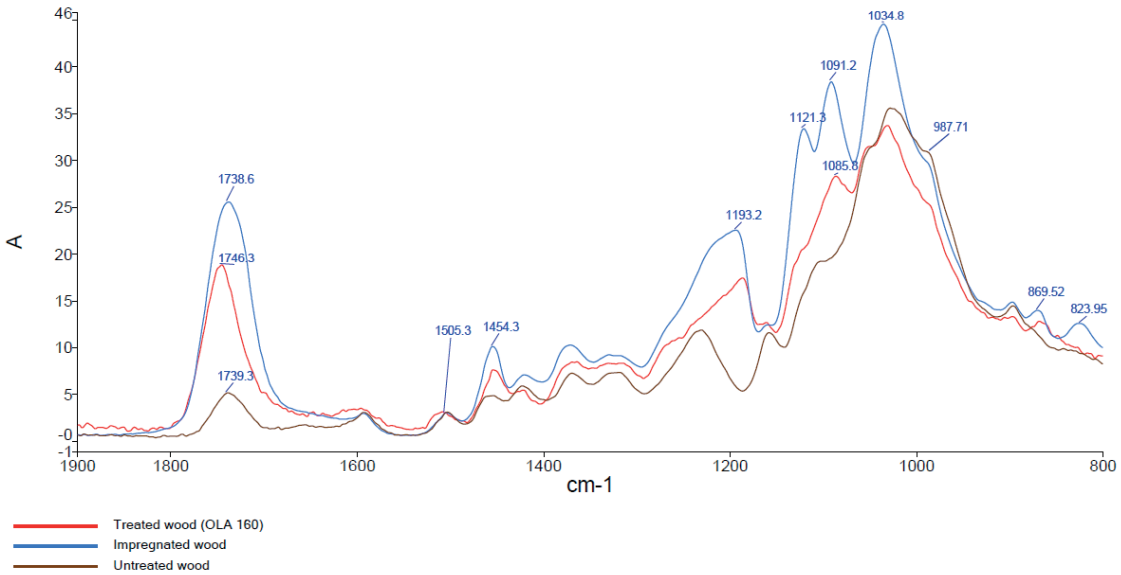

Figure 1: FTIR spectra of untreated wood, impregnated wood and treated wood.

Figure 2: Samples exposed to *Coriolus versicolor* following the EN 113 standard procedure

References

Grosse C., Thévenon M.-F., Noël M., Gérardin P. 2016. Optimizing wood chemical modification with lactic acid oligomers by screening of processing conditions and chemical additives. International Research Group on Wood Protection, Doc. No. IRG/WP 16-40741.

Noël M., Fredon E., Mougel E., Masson E., Masson D., Delmotte L. 2009a. Lactic acid/wood-based composite material. Part 1: Synthesis and characterization. Bioresource Technology, 100: 4711-4716.

Noël M., Fredon E., Mougel E., Masson E., Masson D., Delmotte L. 2009b. Lactic acid/wood-based composite material. Part 2: Physical and mechanical performance. Bioresource Technology, 100: 4717-4722.

Noël M., Grigsby W., Vitkeviciute I., Volkmer T. 2015. Modifying wood with bio-polyesters: Analysis and performance. International Wood Product Journal, 6, 1: 14-20.

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