

Performance of modified wood in service – multi-sensor and multi-scale evaluation

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ABSTRACT

Today's bio-based building materials, even if well characterized from the technical point of view, are often lacking of reliable models describing their performance during service life. This paper presents summary of the scientific results obtained within framework of BIO4ever project "Bio-materials for building envelope – expected performance, life cycle costing and controlled degradation". The performance of 120 selected façade materials provided by >30 industrial and academic partners was evaluated during 12 months' experimental campaign of natural weathering. A multi-sensor measurement chain for the acquisition of properties at different scales (molecular, microscopic, macroscopic) included both laboratory and on-site techniques. Investigated bio-materials were characterized before, during and after degradation by biotic and a-biotic agents in order to provide experimental data to be used for the better understanding of the bio-materials performance/degradation as a function of time and/or weather dose. Analysis of specific kinetic of degradation of wood constituents allow deep understanding weathering effect. Obtained data were utilized for the development series of numerical models simulating materials appearance changes along the service life of structure. An original software simulating bio-materials' performance in any geographical location has been developed and is currently under validation. Software users will be able to choose a material from the database, select the building location and then simulate the structure look at the brand new stage and during its service life. The tool, dedicated for investors, architects, construction engineers, professional builders, suppliers and other relevant parties, including also final customers is now under integration with the BIM software.