

From fundamentals to valorization: Enzymatic oxidation of cellulosic fibres and underlying mechanisms (FunEnzFibres)



Increased use of renewable materials will be one of the key issues in the future bioeconomy. Cellulose is an interesting and abundant raw material for many applications, especially added-value products such as textiles, hygiene, composites and conductive materials. Recent developments in enzyme technologies provide new possibilities for cellulose modification. Enzymes are natural tools for fibre modification, as such, or when combined with chemistry and physical tools. They are specific catalysts, which can be applied in targeted modifications of different pulp components. Enzymatic treatments can be carried out in mild reaction conditions. They can thus reduce energy consumption and use of harsh chemicals. Sophisticated use of the most recent developments in enzyme technology may not only yield greener, but also improved products.

Lytic polysaccharide monooxygenases (LPMOs) are a recently discovered group of enzymes that have unique capability to oxidize polysaccharides. The project aims at unravelling the potential of enzymatic oxidation of cellulosic fibres for different material solutions. LPMOs can specifically oxidize cellulose and hemicelluloses, which offer totally new tools for modifications of cellulosic fibres. While LPMOs have been widely studied and exploited in improving lignocellulose saccharification, their obvious ability to engineer fibres has been scarcely explored.

The project 'From fundamentals to valorization: Enzymatic oxidation of cellulosic fibres and underlying mechanisms (FunEnzFibres)' aims at unraveling the potential of LPMOs in modification of cellulosic fibres. This will be done using different types of LPMOs, celluloses and fibres and advanced analytic methods. The project is carried out by VTT Technical Research Centre of Finland Ltd, Norwegian University of Life Sciences (NMBU) and University of Natural Resources and Life Sciences (BOKU, Austria) in collaboration with a network of the industrial platform.

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