

MWP – Young Researcher Abstract 2024

Project title: Exploiting the nanoscale design of wood cellulose and bacteria polyhydroxyalkanoates for dispersion-based oxygen and water barrier on 3D fibrous packaging materials	
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Abstract (approx. 200 words): <p>Utilizing the resources available in forests is fundamental for developing society. Due to the sustainable nature and strive to lessen the burden on Earth a focus point today is replacing fossil-based plastics with forest-based resources. This work deals with the aspect of replacing the largest sources of fossil plastics – single use packaging materials. Through the design of formulations comprising of nanocellulose and polyhydroxyalkanoates the goal is to produce fully biobased and water-borne barrier coatings that are applicable on three dimensional substrates using scalable application techniques.</p> <p>This work has focuses on the most fundamental crystalline structures of trees in combination with submicron polyhydroxyalkanoate particles as they are produced by bacteria. The nanoscale size and electrostatic interactions has led to the capacity to form high performing barrier coatings on three dimensional packaging materials that inherits both the water-resistance of polyhydroxyalkanoates and the oxygen barrier of the nanofibril whilst fulfilling the requirements of mechanical cohesion and adhesion to the substrate.</p> <p>The combination of two important and seemingly incompatible biomaterials has in this work been made compatible and showcases the potential in considering biomaterials on different length scales and in different combinations regardless of established physicochemical properties.</p>	
Key words: Nanocellulose, dispersion, polyhydroxyalkanoate, barrier, coating	