

MWP – Young Researcher Abstract 2026

Project title: 3D Forming and Advanced Characterization of Novel Lignocellulose Fiber-Based Structures		
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Abstract (approx. 200 words): The need to reduce plastic use across various applications has increased interest in eco-friendly alternatives such as cellulose fiber materials. However, the converting of these materials to three-dimensional (3D) products remains limited due to the inherent forming constraints of conventional structures like paperboards. Foam-formed fiber materials are a relatively new category of sustainable materials whose structural and mechanical properties can be modified and enhanced. Yet, this research area has remained at the process-structure-property development stage with no actual transition to practical product solutions. This project aims to take the next steps by press-forming these materials into high-quality, complex 3D shapes through an integrated approach. First, by developing ultra-porous foam-formed lignocellulose sheets whose fiber network extensibility can be manipulated in the forming process. Second, by developing an on-line characterization technique that provides real-time analysis of the material behavior during forming, enabling the optimization of the process parameters and product quality, thereby unlocking their full potential to serve as viable alternatives to fossil-based products in packaging and low-structural applications. This research will enable the forest-based industry to move beyond traditional paper products toward advanced, high-value fiber products with complex geometries and improved functionality, thereby further contributing to climate and circular economy goals.		
Key words: Fiber-based materials, foam-formed structures, 3D forming, advanced characterization		