

## MWP – Young Researcher Abstract 2025

<b>Project title:</b> Stronger Than Steel: Reinventing Wood for a Greener Future	
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<p><b>Abstract</b> (approx. 200 words):</p> <p>Wood is one of nature’s most sustainable building materials, but it's held back by limitations like low strength, moisture sensitivity, and poor fire resistance. My research aims to overcome these issues by transforming ordinary wood into a high-performance, eco-friendly alternative to steel, concrete, and plastics. We do this through a novel process that combines densification with in-situ polymerization of polylactic acid (PLA) a biodegradable polymer derived from waste biomass. By impregnating the wood with PLA before hot pressing, we trigger strong hydrogen bonding between the cellulose fibers and the growing polymer chains. This innovation not only enhances mechanical performance but also significantly reduces processing time from 24 to just 8 hours. The result? A fully waterproof, lightweight material with a 150% increase in flexural strength and double the surface hardness. It performs like metal, but it’s renewable, biodegradable, and carbon-sequestering. This research has the potential to unlock value-added wood products for construction, transportation, and packaging. By leveraging forest biomass and bio-based polymers, we contribute to the circular bioeconomy and align with UN Sustainable Development Goals 9 and 13. In short, we’re not just modifying wood, we’re reimagining its future.</p>	
<p><b>Key words:</b> Super-wood, densified wood, cellulose</p>	