

MWP – Young Researcher Abstract 2025

Project title: Cellulose-Ionic Liquid Solution Enabled Strong and Water-Resistant Wood Bonding	
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<p>Abstract:</p> <p>The growing demand for sustainable buildings and new ways to reduce carbon emissions have increased interests in engineered wood as a promising solution. Consequently, there is a rising need for wood applications that combine high mechanical performance with environmental sustainability. A common approach involves laminating multiple layers of wood to form larger and more durable structures. However, the overall mechanical performance of such products depends critically on the quality of the bonding between layers.</p> <p>This research introduces an innovative and eco-friendly bonding strategy based on a cellulose solution derived from pulp dissolved in an ionic liquid (IL)—a renewable polymer that constitutes the primary structural component of plant cell walls. The cellulose–IL solution readily penetrates the wood microstructure and swells the cell walls. Under the combined action of heat and pressure, followed by regeneration in water, the process induces the formation of densely interlocked cell walls with lumina filled by regenerated cellulose, thereby creating a tight and permanent bond between wood layers.</p> <p>The result is a strong, water-resistant bond that is almost twice as strong as regular solid wood. This sustainable bonding method has great potential to improve the performance and environmental impact of wood products used in construction and beyond.</p>	
Key words: Engineered wood; Cellulose solution; Wood bonding method	