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MWP – Young Researcher Abstract 2024

Project title: Valorization of Spruce Bark through Oxidative Catalytic Fractionation: Forest Resource Enhancement	
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Abstract (approx. 200 words)**:**
In the pursuit of competitive and environmentally sustainable forest biorefineries, our research targets a critical bottleneck: the overlooked potential of bark, a substantial component of timber and pulp wood, constituting 10 wt%. Despite its abundance, bark is often relegated to low-value applications, such as burning, squandering its capacity to enrich the biorefinery landscape. Softwood bark, rich in lignin comprising 38% of its composition, holds promise as a source of valuable aromatic compounds. Traditionally, lignin depolymerization methods focus on cleaving β-ether linkages, but such approaches prove impractical for spruce lignin due to its unique and complex composition. Our innovative method, utilizing oxygen as an oxidant, offers a breakthrough in this challenge. By oxidatively depolymerizing spruce bark lignin, we achieve remarkable yields of valuable monophenols—30 times higher than conventional methods— while preserving other fractions intact. This advancement represents a significant stride towards making forest biorefineries more sustainable and competitive. This research not only unlocks the latent value of softwood bark but also fosters a more holistic approach to forest biomass valorization. By tapping into previously overlooked resources and refining novel conversion techniques, we pave the way for forest biorefineries to thrive in a future where sustainability and competitiveness are inseparable goals.

Key words: softwood bark, biorefinery, oxidative catalytic fractionation, vanillin, sustainability