

<https://doi.org/10.7250/CONNECT.2026.052>

# BIO-BASED SURFACE COATING AND POST-PROCESSING OF *Trametes Versicolor* MYCELIUM-BASED LEATHER-LIKE MATERIALS

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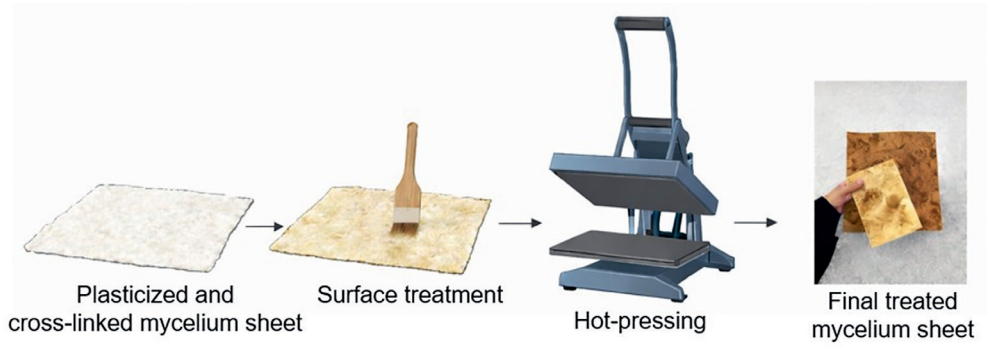
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**Abstract** – The textile and fashion industry is one of the most polluting sectors worldwide, contributing significantly to greenhouse gas emissions and water contamination. Conventional leather tanning is a non-sustainable process that consumes large amounts of water and energy, while releasing heavy metals and toxic compounds into the environment. Although synthetic leather simplifies production, it relies on fossil-derived polymers and is non-biodegradable, raising additional environmental concerns. Filamentous fungi, with their capacity to form leather-like biomaterials through controlled fermentation, represent a promising and sustainable alternative. Mycelium-based materials are emerging as promising bio-derived alternatives to animal and synthetic leather. However, mechanical strength and surface properties remain limiting for commercial applications. This study investigates bio-based post-processing strategies for *Trametes versicolor* mycelium-based leather-like materials produced via liquid-state surface fermentation. Primary focus was on surface functionalization through natural coatings. Hot pressing was first evaluated and then adopted as a standard treatment. Indeed, the ultimate stress of glycerol-treated sheets was increased from  $0.31 \pm 0.06$  to  $0.45 \pm 0.06$  MPa, confirming the suitability of hot processing as a standard consolidation step. Subsequently, sorbitol–citric acid treated mats were coated with seven fully bio-based formulations, including proteins, polysaccharides, shellac, and wax–oil blends, and evaluated through static water contact angle (WCA) measurements. The uncoated control mat exhibited the highest hydrophobicity with WCA of  $99.8^\circ$ , while coated samples showed WCAs ranging from  $65.1^\circ$  (corn zein) to  $95.3^\circ$  (wax–oil balm). Some process steps are presented in the figure. Coatings rich in hydrophobic long-chain molecules yielded the best water repellence properties, whereas protein- and polysaccharide-based films primarily altered surface texture without enhancing wettability. The results highlight the importance of chemical formulation – particularly plasticizer content – in determining surface hydrophobicity, and provide a foundation for the development of scalable, fully bio-based surface finishing treatments for fungal leather-like materials.

**Keywords** – Biofabrication; biomaterials; fungal-leather; fungal biotechnology; liquid-state surface fermentation; mimco-leather, non-leather materials; sustainability; sustainable fashion



Key process steps to obtain *Trametes Versicolor* mycelium-based leather-like sheets