Regenerated Wood: A Novel Approach for the Resurrection of Wood Born Intelligence

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Introduction

Wood itself can be regarded as an intelligent material, it is able to react to humidity variations by changing its shape and its porosity (shrinking and swelling). The shape memory effect of wood strongly relies on this phenomenon. Lignin absorbs UV-light and undergoes photochemical reactions with oxygen leading to the formation of colored compounds called chromophores. This in turn confers wood the ability to sense UV light or more generally sunlight. This contribution reports on our very recent progress regarding the ability to transfer this intelligence to coatings.

Objectives

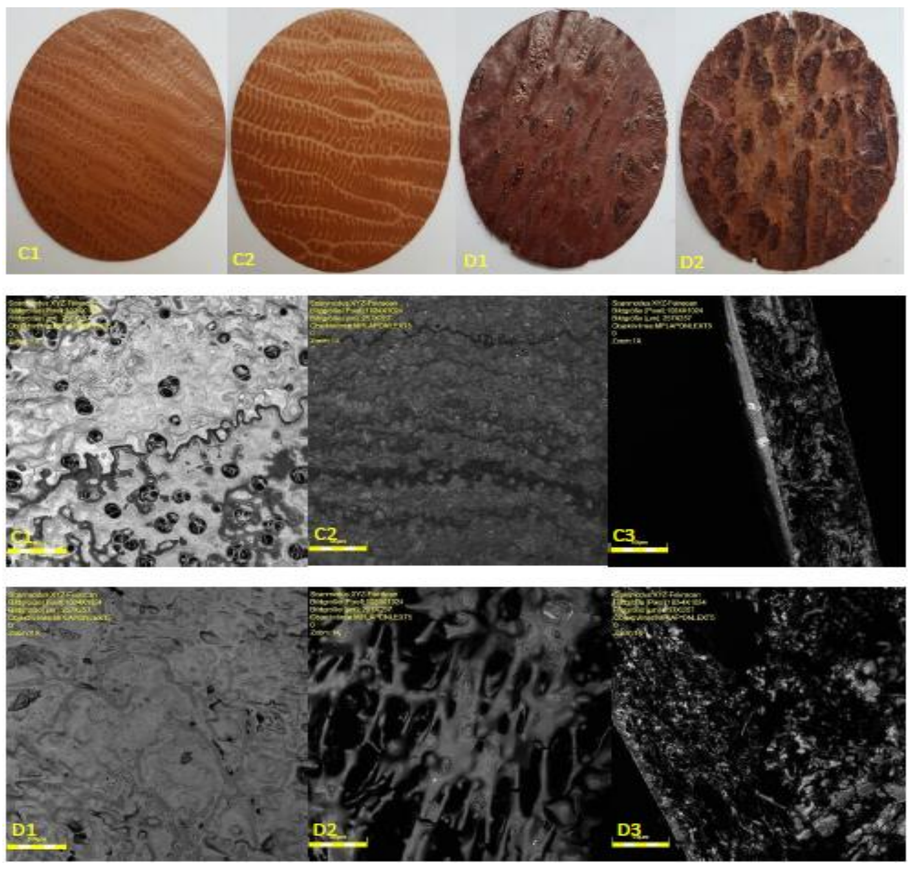
Starting from the most abundant biopolymers cellulose and lignin, our approach led to a dry cast process for the production of regenerated wood that can be achieved at large industrial scale. According to this process, regenerated wood is obtained by casting and drying a particular polymer solution under well-defined conditions.

Methodology

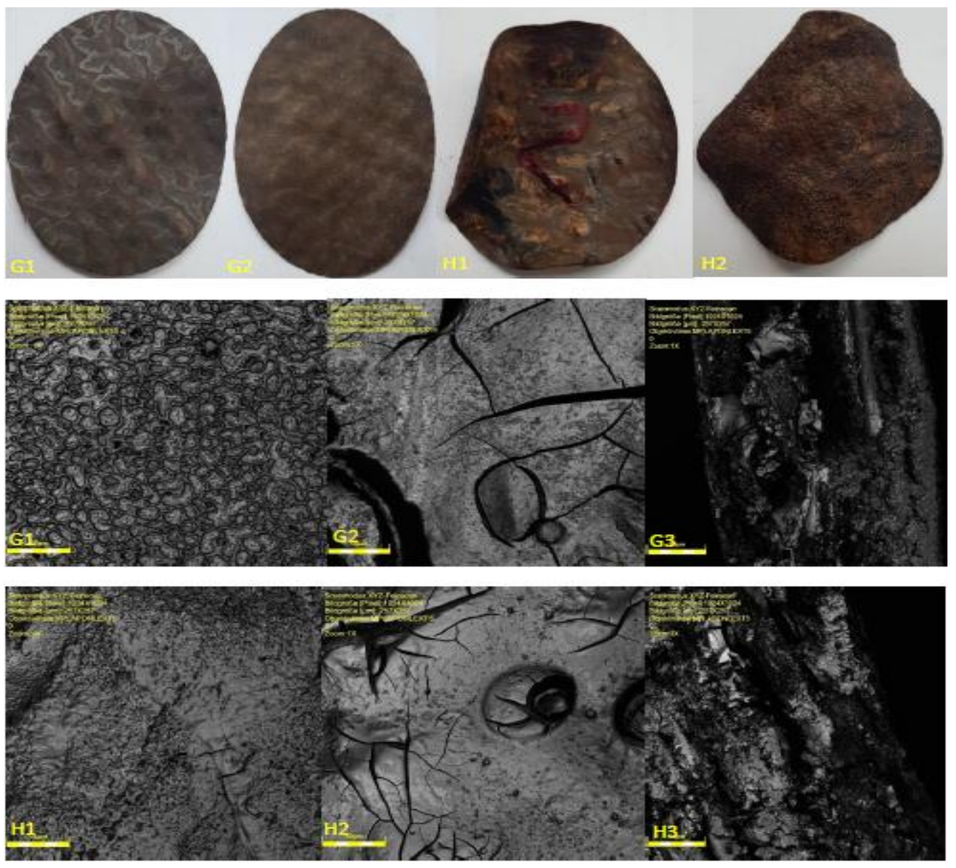
Cellulose Acetate + Lignin + Acetone + Water → Dry Cast → Saponification

Results

Cellulose Acetate & Organosolv Lignin



Cellulose Acetate & Kraft Lignin



Conclusions

In contrast to native wood, regenerated wood does not exhibit mesopores and is a characterized by a homogeneous macroporous structure. This in turn may facilitate mass transfer within the coating. Wood regeneration via saponification appeared to work better with Kraft lignin than with Organosolv Lignin.