



Use of microalgae in the wood-based panels industry

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Introduction

Microalgae are a promising feedstock for the sustainable supply of commodities. In MIRACLES EU project, CHIMAR evaluated various fractions from different microalgae species for their efficiency to be used as raw-materials in the synthesis of thermosetting polymers, suitable to be used as adhesives in the production of wood-based panels.

Experimental work

CHIMAR developed thermosetting polymers (resins) of phenolic type (phenol-formaldehyde -PF- resins) with partial replacement of phenol by the biomass of various microalgae species (like *Phaeodactylum*, *Spirulina*, *Tetraselmis*, *Nanochloropsis*, *Scenedesmus*, *Chlorella*), their protein fractions and residues resulted from the separation of other chemicals (e.g. lipids).



The chemical bonds created among microalgae biomass and petrochemical raw-materials were verified with Fourier Transform Infrared spectroscopy (FTIR). Their thermal properties of the experimental resins were studied with Thermogravimetric Analysis (TGA) and Differential Scanning Calorimetry (DSC) measurements.

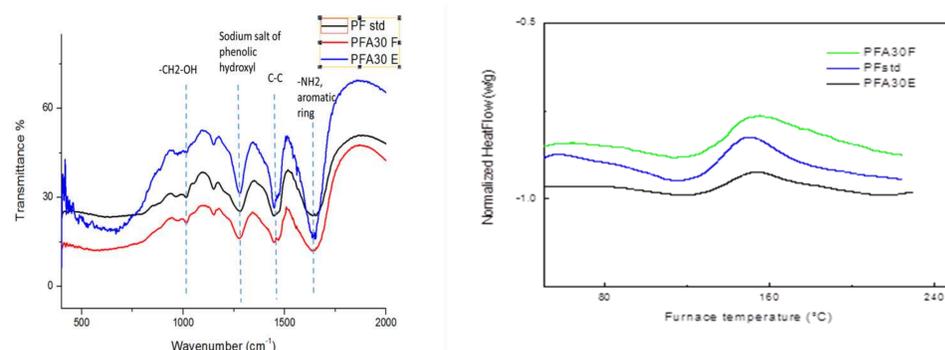
Plywood panels

The bonding ability of the new resins was evaluated via their application in the production of plywood panels. The panels were prepared at lab scale following a simulation of the industrial practice and were tested according to the European standards in force (EN 314-1:2004 and EN 314-2:1993).

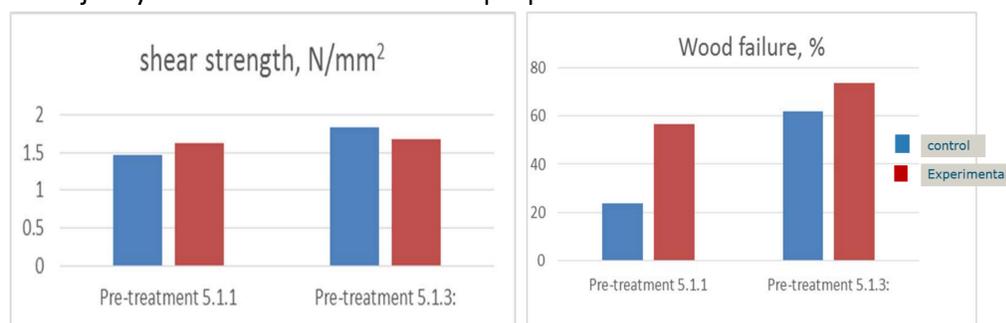


Results

It was found that the new resins were successfully prepared.



The plywood panels prepared with the experimental resins had in their majority similar or even advanced properties to a control PF resin



Conclusions

Different biomass fractions of various microalgae, may successfully replace petrochemical phenol in the synthesis of PF resins at levels up to 30%, increasing so the bio-content of these resins and making them more friendly to people and the environment.

Covering material

Microalgae biomass was also successfully used for the development of bio-based covering material suitable to be used for the lamination of wood-based panels.



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