Development and Characterization of Waste-Based Biomaterials

J. Seijo, H. Domínguez, M.D. Torres*

CINBIO

Universidade de Vigo

CINBIO, Universidade de Vigo, 32004 Ourense, Spain.

Departamento Ingeniería Química, Facultad de Ciencias, As Lagoas S/N, 32004 Ourense, España

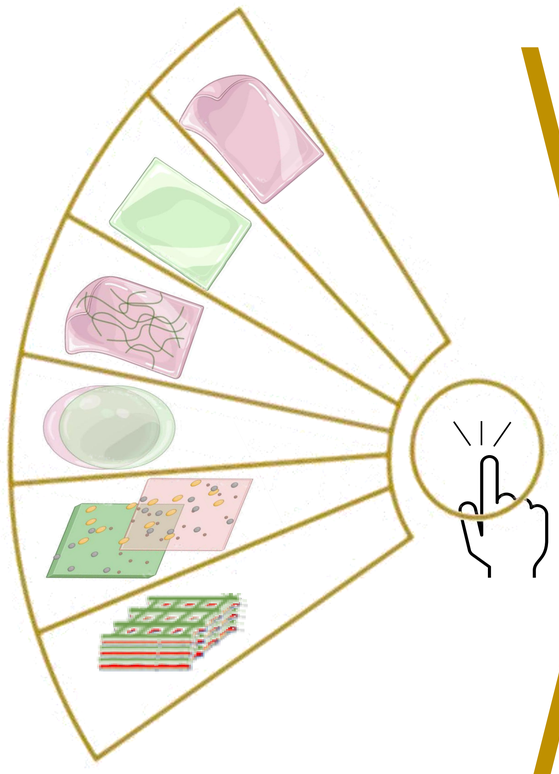
*Corresponding author: matorres@uvigo.gal

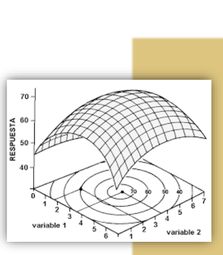
INTRODUCTION

The growing demand for sustainable materials has driven increasing interest in the valorization of marine biomass residues within circular economy and biorefinery frameworks [1]. In this context, marine macroalgae represent a promising renewable resource due to their availability and functional biopolymer content. This work aims to develop and characterize novel waste-based biomaterials derived from red and green marine algae obtained through green extraction technologies, with particular emphasis on hydrothermal processing [2].

The study focuses on the use of *Mastocarpus stellatus* red seaweed and *Ulva spp. green* seaweed residues generated within a biorefinery approach, contributing to the sustainable exploitation of marine resources.

EXPERIMENTAL PROCESSING





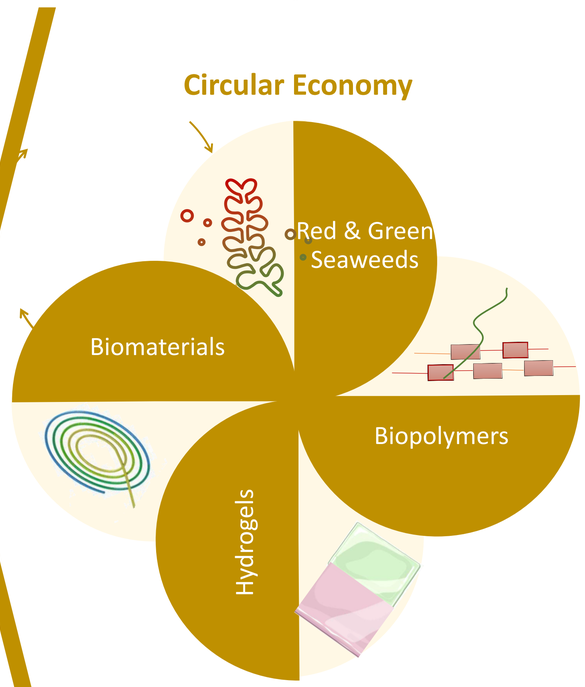
Processing Conditions

Extrusion and injection temperatures

Extrusion and injection speed

Holding pressure

Cooling time



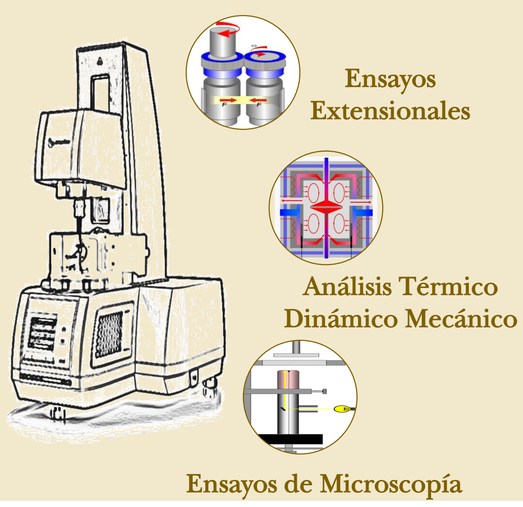
Thermorheology

Small Amplitude Oscillatory Shear (SAOS) [Viscoelasticity]

Temperature sweeps [Melting temperatures]

Temperature sweeps + SAOS [Termoreversivility]

Time sweeps [Storage stability]



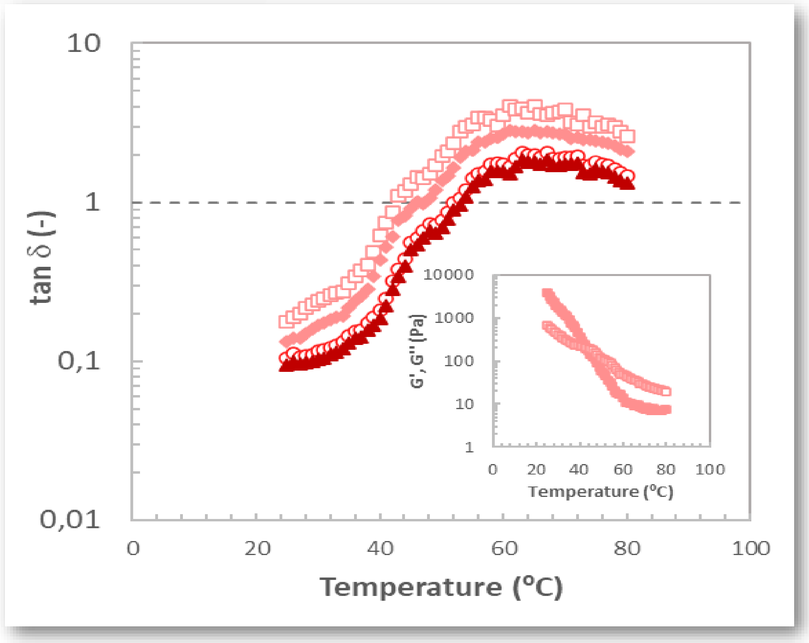
1 **Selected Matrices**

2 **Thermopressing**

3 **Biomaterials**

MAIN REMARKS

The results demonstrated that it is possible to obtain biomaterials with adequate mechanical properties for potential manufacturing applications. Additionally, the presence of natural plasticizers significantly enhanced the material flexibility and improved the stability during storage. Overall, these findings highlight the potential of marine waste-derived biomaterials as sustainable alternative sources for engineering applications.



REFERENCES

[1] M.D. Torres, S. Kraan, H. Domínguez, Rev. Environ. Sci. Biotechnol., 18 (2019).

[2] V. Sanz, K.L. Blatrusch, M.D. Torres, H. Domínguez, M.J. Fabra, A. López-Rubio, Food Hydrocoll., 172 (2026).