PLA coating improves the performance of renewable adsorbent pads based on cellulosic aerogels from aquatic waste biomass

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Abstract

Lightweight, hydrophobic, adsorbent aerogels from different cellulosic and nanocellulosic fractions from *Posidonia oceanica* waste biomass were developed by a simple freeze-drying and PLA dipping method. The pure (nano)cellulosic aerogels presented highly porous structures, capable of adsorbing large amounts of oil (up to ~34 g oil/g aerogel) but lost their integrity when soaked in water. The incorporation of PLA hydrophobized the aerogels and improved significantly their mechanical performance (up to 10-fold increase in the compression stress) (Fig. 1). The most porous aerogels, obtained with the less purified fractions, incorporated greater amounts of PLA, which was mostly distributed filling in the pores. All the PLA-coated (nano)cellulosic aerogels presented a hydrophobic behavior, with contact angles of 95-130º and selectively adsorbing greater amounts of oil (5.9-9.2 g oil/g aerogel) than water (2.8-6.7 g H_2O/g aerogel). These materials present a great potential for oil spill cleaning and food packaging applications.

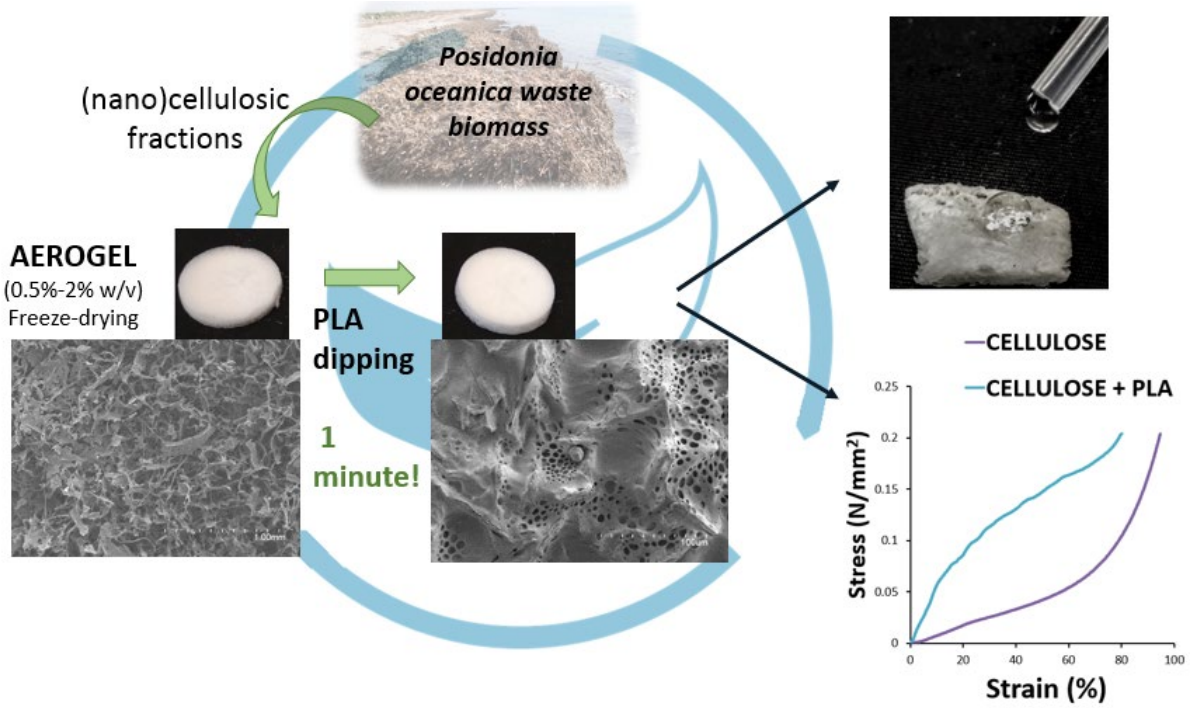

Figure 1. Schematic representation of the dipping process with some of their most relevant outcomes.

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