Bio-Sustainable, Water-Soluble and Antimicrobial Film Derived From Citrus Waste

Pantanali, Lisa (School: ISIS Arturo Malignani Udine)
Paron, Edoardo (School: ISIS Arturo Malignani Udine)

The aim of this work is to produce, in an economical and efficient way, a biocompatible material, as an alternative to plastics derived for fossil fuels. This material, better known as biofilm, is produced from food production waste, such as citrus peels from which we extracted pectin, a polysaccharide of galactouronic acid we then caused to precipitate with ethyl alcohol after extracting an orange solution from boiling the peels. After various tests, the best formulation, which has the characteristics we aimed at, contains casein and sucrose, in addition to pectin. The main characteristic of this product lies in the fact that a large part of the substances used is obtained from production waste thus promoting circular economy, as set out in goal 12 of 2030 Agenda. In addition to this, our biofilm is completely biodegradable and biosustainable, according to goal 13 of the UN Agenda. Other properties of the new material are solubility and resistance to heat and to mold and bacteria. It is soluble in polar solvents such as water, unlike commercial parafilm which is soluble in non-polar solvents. Biofilm is more heat-resistant than parafilm (over 100°C) and it is antimicrobial and antifungal. Thanks to these innumerable properties, we have thought about some possible practical applications: as a wrapper for fertilizer pods or dishwasher detergents and as a liquid film to be applied on easily degradable fruit, in order to extend their shelf-life.

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