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Synthesis and characterization of maleic anhydride grafted orange waste

Veronika Bátorı, Mostafa Jabbari, Dan Åkesson, Patrik Lennartsson, Akram Zamani and Mohammad J Taherzadeh
Swedish Centre for Resource Recovery, Sweden

Biopolymers are hygroscopic substances that produce bio-based thermoplastics sensitive to water. These hydrophilic plastics, such as made from starch at the same time have low mechanical properties, and blending is usually required with polymers that are resistant to moisture and have good mechanical properties. In polymeric blends and composites interfacial adhesion between the components plays a crucial role to achieve adequate physico-mechanical properties.

Orientation: In our newly-developed orange waste composite (OWC), we face similar problems: the almost entirely polysaccharide based composite is hydrophilic and swells when it interacts with water. A well-known compatibilizer between fibres and resin, maleic anhydride (MA) has been used to modify polysaccharides. The objective of this study was to modify orange waste (OW) with MA in order to improve properties of OWC. The purpose of modification was to overcome the hydrophilic behaviour of biopolymers by replacing the polar hydroxyl groups with less polar ester linkages to MA; also, to increase entanglement of the chains and to enable cross-linking between polymeric chains to improve mechanical features.

Findings: Esterification of OW was confirmed by FTIR spectroscopy. Because the major component of OW is pectin, the peaks describing the degree of esterification of pectin were analysed. Changes of broadband from 1700 to 1750 cm^{-1} (COOR) and from 1600 to 1630 cm^{-1} (COOH) were observed as a result of the esterification reaction. The change of the peak areas is confirming the presence of conjugated ester groups in the structure of OW-MA. The modification increased the ratio of COOR groups, consequently the increase of the peak area at 1737 cm^{-1} was seen compared to the spectra of neat OW.

Conclusion & Significance: However, OW is a complex substrate it could be esterified with MA in order to produce biocomposites, to possibly reduce plastic pollution of the planet.

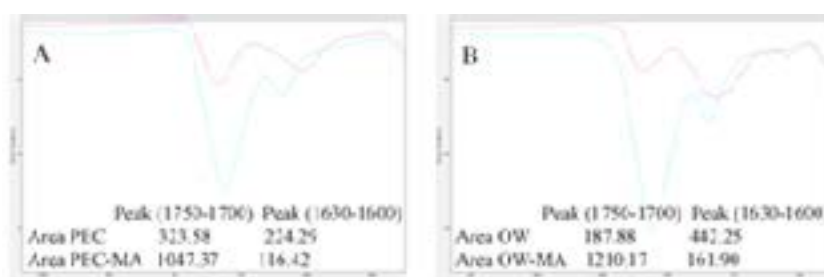


Figure 1: Changes of broadband (COOR and COOH) of PEC/PEC-MA (A) and OW/OW-MA (B)

Biography

Veronika Bátorı is an environmentally conscious lady and one of her main concerns is plastics bags or plastics in general. Therefore, she has dedicated some of her time to investigate biocomposites made from industrial orange waste. She is also passionate about music festivals, plants, and healthy food. She has been studying pectin based biocomposites and she is continuously thinking how to incorporate her passion with her profession in order to make the world a better place (starting it with herself, of course).

veronika.batori@hb.se

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