

CASSAVA STARCH FILMS REINFORCED WITH NANOCELLULOSE

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Abstract

A shift in market demands towards conscious consumption has led to an increasing search for sustainable packaging. A promising source for film production is cassava starch. However, the properties of this native starch are limited. To overcome this limitation, starch can be modified by ozone technology, which is an environmentally friendly alternative. Therefore, in this study, biodegradable films were produced from cassava starch modified by ozone and reinforced with nanocellulose.

At first, cassava starch was ozonated in water suspension for different periods (15 and 30 min). The films were produced by the *casting* technique as follows: a solution containing 5 g/100 g of these starches, glycerol (25 g /100 g of starch), nanocellulose (5 g /100 g of starch) and water was prepared. The solution was poured and then dried at 35

°C and 45% HR for ~ 10 h. Next, the films were conditioned for at least 48 h in desiccators at 75% RH before characterization. Films were characterized in terms of their mechanical (ASTM D882-09), barrier (ASTM E96-80) and functional properties – expressed in terms of contact angle (ASTM D7334-08) – and opacity.

Regarding the mechanical properties, nanocellulose reduced the tensile strength and the Young modulus for the non-modified and ozonated films. However, an increase in elongation was only observed for the non-modified films. A decrease in water vapour permeation, due to the presence of the nanocellulose, was observed for all the films formulation, which is a highly interesting result. An increase in hydrophilicity was only observed for the 30 min ozonated film. Moreover, as expected, an increase in opacity was also observed due to the addition of the nanocomposite.

Therefore, the addition of nanocellulose resulted in an opaque film with enhanced barrier properties, proving to be a good alternative for starch based packaging production.

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