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Natural deep eutectic solvent as biodegradable plasticizer for the fabrication of innovative pectin films

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For a long time, due to total non-biodegradability, synthetic polymers have caused a serious ecological problem producing large amounts of waste which can be toxic to biological life. With environmental conscience, consumers are demanding, more and more, for better features and convenience in packaging materials that do not cause health/ecological problems and that could replace the conventional non-biodegradable ones. This environmental issues and the adoption of new regulatory requirements for packaging material has opened a big door of opportunity for business companies to develop eco-friendly packaging. In this sense, research on packaging materials based on polysaccharides (PI) has been growing, showing that these biopolymers can be considered good candidates for the production of biodegradable films. Among them, pectin (a natural polysaccharide found in some fruits such as berries, apples and oranges) has been broadly used in food packaging due to its abundance, low cost, and renewability. However, films produced with pure pectin (mostly produced by casting method) are highly soluble in water and present poor mechanical properties. To solve these problems, the application of ionic liquid analogous, such as natural deep eutectic solvents (NADESs), has, recently, gained attention due to their good properties such as thermal stability. As far as we know, the use of choline chloride (ChCl)-based natural deep eutectic solvents as plasticizer for the production of pectin films by thermos-compression molding has not been yet reported. In this work, we report, for the first time, the successful fabrication, by thermos-compression molding, of bio-films from ecofriendly, biodegradable products such as pectin using NADESs as plasticizer (ChCl/glycerol 1:1). The impact of compression molding parameters on films microstructure, mechanical and water resistance properties was studied. The results were compared with those obtained for pectin films prepared by the same technique but using only glycerol in their formulation.

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