

International Conference and Exhibition on

Materials Chemistry

March 31-April 01, 2016 Valencia, Spain

Improving PLA properties through the incorporation of electrospun nanofibers based on PVA and cellulose nanowhiskers

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Driven by a growing consciousness for the environment and the need to diminish plastic waste, there is a great interest to develop sustainable and ecofriendly materials with enhanced properties. Among biodegradable polymers, poly (lactic acid), PLA, has attracted the most interest in recent years because it is being produced industrially and it comes from a renewable source. However, in order to be massively used in the food industry, some characteristics must be improved, such as mechanical and barrier properties. Some works have aimed the improvement of these characteristics based on the incorporation of different additives and during last years, the most innovative solution is the reinforcement through nanotechnology, such as the incorporation of organic clay or cellulose nanoparticles (CNW) in its formulation. Regarding the latter technique, the biggest inconvenient is the incorporation of the reinforcing material to the polymeric matrix homogeneously, preventing agglomerations to maximize results. Therefore, the objective of this work was to create a biocomposite based on PLA nanoreinforced with CNW nanoencapsulated with poly (vinyl alcohol), PVOH, through electrospinning technique. First, the optimizations of the electrospinning parameters were studied owing to obtain nanofibers with good appearance, measured by SEM microscopy, high concentration of CNW and minimum amount of PVOH. Thus, it is intended to incorporate homogeneously the CNW in the PLA preventing agglomerations, obtaining a material with better mechanical and barrier properties without altering the advantageous characteristics such as optical properties and biodegradability. Materials were obtained through extrusion and were thermally, morphologically and mechanically characterized.

Biography

Carol Lopez de Dicastillo is currently working as Associate Researcher in the Food Packaging Laboratory, in the Department of Food Technology from the University of Santiago de Chile. Her undergraduate background is on chemistry, and she has focused her PhD and post doctorate on Food Technology and Materials Science. Her PhD was carried out in the Institute of Agrochemistry and Food Technology (IATA-CSIC) in Valencia and it was based in the development of hydrophilic active materials, mainly focused on antioxidant releasing systems. Nowadays, new topics have joined her work, such as biodegradable polymers, nanotechnology, electrospinning and search for natural compounds from plant extracts.

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