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Presentation Abstract

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Presentation Title:	Development of carrageenan-chitosan nanostructured coatings through layer-by-layer assembly for food applications
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Presentation Description/Abstract:	Nanotechnology holds a great potential to generate very innovative solutions and to provide food technologists with instruments to meet the ever-growing consumer demands in very diverse aspects related with the foods they eat: safety, quality, health-promotion and novelty. Layer-by-layer assembly, which is performed by the simple alternating immersion of substrates into aqueous solutions of oppositely charged polyelectrolytes, can be applied to produce multilayers of nanometer thickness on various surfaces. Multilayered coatings can be specially engineered to incorporate and allow the controlled release of bioactive compounds and can be used to coat food systems such as fresh-cut fruits and vegetables. The aim of the present work was to develop a multilayer coating through layer-by-layer assembly technique using two oppositely charged polysaccharides, carrageenan (zeta potential of -57 mV) and chitosan (zeta potencial=+46 mV), onto aminolyzed/charged polyethylene terephthalate (PET) and to characterize the film in terms of its permeabilities and surface properties. The carrageenan/chitosan system was chosen for this study due to their water barrier and antimicrobial properties, respectively. The adsorption of the polyelectrolytes on PET surfaces was monitored by UV-VIS spectroscopy and contact angle measurements and analysed by scanning electron microscopy (SEM). The nanolaminates, composed by three carrageenan and two chitosan layers, has been successfully assembled on PET substrate, as confirmed by the increase of absorbance (from 3.9 ± 0.1 to 4.3 ± 0.1 at 260 nm), changes in the contact angle and SEM (nanolayers total thickness of 171.1 nm). The carrageenan/chitosan multilayers exhibits a water vapour permeability of 1.00×10^{-13} g $m^{-1}s^{-1}Pa^{-1}$ and O_2 and CO_2 permeabilities of 4.84×10^{-14} g.m.Pa^{-1}.s^{-1}.m^{-2}

and 1.04 x 10^{-11} g.m.Pa^{-1}.s^{-1}.m^{-2}, respectively.These results will contribute to the establishment of an approach to produce edible multilayers with improved characteristics to coat e.g. fresh and minimally processed fruits, aiming at a higher benefit for the product/consumer.