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Development of a novel strategy for the fabrication of LLDPE-OMMT hybrid multilayer films for food packaging

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The purpose of this study is to develop a novel strategy to fabricate linear low density polyethylene (LLDPE)-Organically modified Montmorillonite clay (OMMT) stratified composite films to reinforce the PE packaging materials and improve its functional properties. This strategy consists of assembling OMMT layers on PE surfaces based on solvophobic molecular construction involving hydrophobic interactions between the organic parts of the organoclay tactoids and the PE hydrophobic surfaces and further physical adsorption of LLDPE molecules on the organoclay layers driven by a dip-coating process. The successful preparation of the multilayers was confirmed by the profilometry and the scanning electron microscopy characterization results showing a linear growth of repetitive bilayers comprised of 450 nm OMMT and 2.25 μm LLDPE layers on the 160 μm LLDPE substrate film. Moreover, the alternate variation of water contact angles (85° average for OMMT and 107° for LLDPE layers) proved the nature of each layer material. Up to 5 bilayers were deposited on each side of the substrate by successive repeating depositions resulting in robust hybrid multilayer composite films. Further characterization results suggest that the developed self-assembly process can be used as an effective strategy to achieve enhanced barrier effect and that films prepared with such complexes have great potential as food packaging materials.

Biography

Ali Akbar Motedayen is currently a PhD candidate in the University of Montpellier, France. His thesis work is related to the self-assembly of hydrophobic materials for the fabrication of hybrid nano-enabled multilayer food packaging films. He has completed his Msc in the field of food science and industry working on the development of novel biodegradable composite films from starch and Kefiran and published a scientific article on that subject in the "Food Chemistry" journal. Nanocomposite and biodegradable films and their application for extending shelf life of food products are his field of interest.

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