

Polymeric materials for sustainable food packaging

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Statement of the Problem: Food packaging plays a crucial role in keeping foods fresh for longer and securing food safety. However, the widely used plastic food packaging in the current market is non-compostable and recycling laminated multilayer plastic packaging, which consists of various types of plastic layers with specific function, is next to impossible. As a result, single used plastic packaging is one of the main sources of plastic pollution both on land and in oceans. In this study, a silicate/polymer nanocomposite gas barrier coating is successfully developed. It is produced by using existing infrastructure through a green process without VOC emission and lower energy consumption. During application, the plate-like silicate filler is aligned along with the coated substrate very well, creating highly efficient torturous path of gas molecules to enhance its gas barrier. The gas barrier coating has been successfully applied onto polyolefin films to produce recyclable mono-polyolefin packaging to replace non-recyclable multilayer plastic packaging. The oxygen transmission rate of the prepared mono-polyolefin film is of 0.5 cc/(m².day) or lower, with silicate/polymer coating thickness of 0.3 µm. Our study demonstrates that the silicate/polymer coating does not affect the mechanical recycle of the mono-polyolefin film. In order to further extend the shelf life of foods, essential oil@silicate antimicrobial filler have been developed and integrated with polyolefin to produce recyclable mono-polyolefin active packaging

Biography

Xu LI is a Senior Principal Scientist at Institute of Sustainability for Chemicals, Energy and Environment (ISCE2) and Institute of Materials Research and Engineering (IMRE), A*STAR, where he leads a research team dedicated to studying polymer nanocomposite for sustainable food packaging. The main research focus of his team is 1) design and synthesis of high-performance polymer materials and functional fillers and 2) incorporation of functional filler into polymer material with controlled filler distribution and tuned interfacial bonding between filler and polymer matrix to produce high performance polymeric materials. As an Adjunct Associate Professor at the Department of Food Science and Technology, National University of Singapore, his study is on food preservation by using hybrid polymers. His oxygen barrier and oxygen scavenging technology has been successfully integrated with polyolefin to produce recyclable mono-polyolefin food packaging.

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