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Advanced technology for barrier and oxygen-scavenging packaging

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The main purpose of packaging is to protect the packed products from contamination and maintain high quality level of the products over sufficient period during distribution, storage, sale and use. Products especially for perishable foods are highly sensitive to oxygen. However, conventional transparent plastic films have poor oxygen barrier property and the technologies in the market to improve packaging's oxygen barrier usually lead to high equipment investment, high energy consumption, and low transparency. To overcome these issues, two technologies have been developed by our group. For the first transparent oxygen-barrier packaging technology, natural source silicate nanomaterials have been successfully introduced into polymer matrix to produce gelatinous coating suspension and such developed coating suspension can be applied onto plastic films to produce laminated films with high oxygen barrier. The key technology here is to align all the plate-like silicate nanomaterials in one orientation along the plastic substrate such as PET film to create high efficient torturous path against oxygen molecules, which is simply implemented via standard doctor-blade coating process. This process is compatible with the standard coating and lamination process applied in plastic film industries. With this technology, transparent polymer films with oxygen transmission rate less than 0.5 cc/m² day have been achieved. The other technology is to introduce active component, such as the oxygen scavenger to remove the residue oxygen in the headspace of food packaging. Iron-based nanomaterials with high oxygen scavenging property have been developed and integrated into coating suspension to prepare transparent coating. Such transparent coating can achieve oxygen scavenging capacity about 8.8 cc/100 cm². It can be applied to pack paste food or liquid food, which it is impossible with oxygen scavenger in sachet.

Biography

Xu Li is a Senior Scientist at Institute of Materials Research and Engineering (IMRE), Agency for Science, Technology and Research (A*STAR), Singapore. He finished his PhD in Polymer Chemistry in the Department of Chemistry, National University of Singapore in 2001. He is an Adjunct Associate Professor of the Department of Chemistry, National University of Singapore from 2012. He has published more than 100 research papers and filed 15 international patents of which some of the patented technologies were successfully adopted by industries. As a Principle Investigator, he is now leading a research team on polymeric materials development for various applications, including controlled release, bioimaging, energy storage and food packaging.

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