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Preparation and Characterization of Poly(ether-block-amide)/Polyethylene glycol Composite Films for Packaging Application

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The microwave markets are expected to witness remarkable growth fueled by consumer demands due to the need for the ease of preparation and portability to consume on the go. The critical problems of microwave cooking are expansion of internal pressure, explosion of package, and migration of chemical compound from the package into the food product during cooking. This issue can be solved by improving the packaging materials and design such as a weak heat seal, shrink-film-covered vent valves, and laser scored or perforated film. However, multiple processes are required to produce such packages, which lead to relatively high production cost. In this study, it is proposed to develop polymer/phase change materials (PCM) films with temperature responsive gas permeability as packaging materials as it have the characteristic of self ventilation and applicable to use in microwave oven by preventing the damages and explosion of packaging during the cooking process. A series of poly(ether-block-amide)/polyethylene glycol (PEBAX/PEG) composite films are prepared by solution casting technique. The permeation properties, morphologies, thermal properties, and water sorption are interpreted as a function of PEG with different molecular weights. The phase change and gas permeation property of composite films are significantly dependent on the molecular weight of PEGs. Incorporation of low molecular weight PEGs (PEG 950-1050 and PEG 3350) into PEBAX matrix showed a lower oxygen transmission rate (OTR) than pure PEBAX films in the measured temperature ranged from 10 °C to a relatively low melting temperatures of each PEGs, which is due to good interaction between PEBAX and PEGs, and an increase in crystallinity of the composite film by introducing PEGs. As the measurement temperature is increased from the melting temperatures of each PEGs to 80°C, the OTR of composite films dramatically increased. The composite films exhibited permeation jumps that occur at the melting point of crystallized phase depending on the molecular weight of PEGs. The composite film incorporated with high molecular weight PEG exhibited highest permeation jump.

Biography

Sarinthip Thanakkasaranee has completed her Master of Science in Packaging Technology from Kasetsart University, Thailand. During her M.Sc., degree, she has received research grant under "The Thailand Research Fund - Master Research Grants (TRF-MAG) Window I " from Thailand Research Fund in 2011. She also won outstanding Master's thesis award in the discipline of physical science, and the excellent student award in the Master's degree program from Kasetsart University in 2012. She had worked in the position of Product Development Executive, SML (Thailand) Co., Ltd. and Innovation Designer and Coordinator, Science and Technology Park, Chiang Mai University (CMU STeP). Now, she is doing Ph.D under a guidance of Prof. Jongchul Seo in the Department of Packaging, Yonsei University, South Korea. She also received the Outstanding Foreign Student Scholarship for her Ph.D. program. She has published 2 research papers in peer-reviewed International Journals and also presented her 4 (2 oral, 2 poster) research results in International Conferences.

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