

International Conference on
DIABETES AND HEALTHCARE
&
International Conference on
FOOD SCIENCE AND TECHNOLOGY
June 25-26, 2018 | Toronto, Canada

Food packaging based on 2-dimensional atomic layers for high-efficiency multi-layer-nanostructure smart sensors

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Nanotechnology has been applied by packaging industry for some years. Successful technical development of nanostructures for food packaging has to overcome barriers in safety, technology, trained workforce and technology transfer in order that commercial products can benefit from the global market potential and requires therefore a high degree of multidisciplinary. The most widely known theories to explain the improved barrier properties of nanocomposites are based on a theory developed, which focuses on a tortuous path around the two dimensional atomic layers, forcing the gas permeant to travel a longer path to diffuse through the film. Two dimensional (2-D) atomic layers have several advantages such as flexibility in choosing substrates, easy fabrication, large package area, minimum change of components, enhanced expiration date, and reduced defects by oxygen blocking structure for smart packages. The formation of 2-D atomic layers

preventing oxygen penetration is crucial for enhancing the efficiency of multi-layer-nanostructures(MLNs). The nanostructures of two types of packages containing defect-free MLNs with atomic layer and defective thin film were determined by scanning electron microscopy and high-resolution transmission electron microscopy. The defective thin film has a porous structure, whereas the defect-free MLNs with atomic layer had a single crystal structure. The device consists of an array of nanosensors extremely sensitive to gases released by spoiling microorganisms, producing a colour change which indicates whether the food is deteriorated. These results suggest that the well-defined 2-dimensional atomic layer of MLNs can be utilized for the high- efficiency smart packages. This work was supported by a grant to the FTA Program (no. PJ011885032018), Rural Development Administration, Republic of Korea.

Biography

Sung Won Hwang is an Assistant Professor at the Division of Nano Science and Mechatronics Engineering at Konkuk University in South Korea. Prof. Hwang worked for Samsung Electronics for the last 9 years. He has more than 30 patents related to the nano-materials and nano-structures. He also published 7 peer reviewed scientific articles from last two years. Prof. Hwang is now focusing on development of nano-carriers and smart packages at the Konkuk University in South Korea.

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