The 1st International Conference and Exhibition on Powder Technology Indonesia (ICePTi) 2017

Jatinangor, Indonesia
8–9 August 2017

Editors
I Made Joni and Camellia Panatarani
The 1st International Conference and Exhibition on Powder Technology Indonesia (ICePTi) 2017

Jatinangor, Indonesia
8–9 August 2017

Editors
I Made Joni
Camellia Panatarani
Universitas Padjadjaran, West Java, Indonesia

Sponsoring Organizations
Nanotechnology and Graphene Research Center, Universitas Padjadjaran
Science and Techno Park (STP) Universitas Padjadjaran
Material Science & Engineering Study Center, Universitas Padjadjaran
JP Global Transtech
Ashizawa Finetech Ltd.
Ohkawara Kakohki Co., Ltd.
Kajiwara Inc.
Kett Electric Laboratory
Seishin Enterprise Co., Ltd.
Tsutsui Scientific Instrument Co., Ltd.
Toyo Hitec Co., Ltd.
Tokujin Corporation
 Eriez Magnetics Japan Co., Ltd.
Hakaru Plus Corporation
Makino Mfg. Co., Ltd.
Matsushima Measure Tech Co., Ltd.
Matubo Corporation

All papers have been peer reviewed

To learn more about AIP Conference Proceedings visit http://proceedings.aip.org
Morphological characterization of ceramic fillers made from Indonesian natural sand as restorative dental materials
  E. Karlina, S. Susra, Y. Fatmala, H. M. Hartoyo, V. Takarini, K. Usri, R. Febrida, N. Djustiana, C. Panatarani, and I M. Joni

The dispersion of fine chitosan particles by beads-milling
  Emma Rochima, Safira Utami, Herman Hamdani, Sundoro Yoga Azhary, Danar Praseptiangga, I Made Joni, and Camellia Panatarani

The variable charge of andisols as affected by nanoparticles of rock phosphate and phosphate solubilizing bacteria
  M. Arifin, N. Nurlaeny, R. Devnita, B. N. Fitriatin, A. Sandrawati, and Y. Supriatna

The impact of anaerobic microorganisms activities in ruminant waste and coal

The phosphorus status of andisols as influenced by nanoparticles of volcanic ash and rock phosphate
  Rina Devnita, Benny Joy, Mahfud Arifin, Ade Setiawan, Santi Rosniawaty, and Felia Shella Meidina

Comparative study of CO₂ and H₂O activation in the synthesis of carbon electrode for supercapacitors
  E. Taer, Apriwandi, Yusriwandi, W. S. Mustika, Zulkifli, R. Taslim, Sugianto, B. Kurniasih, Agustino, and P. Dewi

Cell viability of mycorrhiza helper bacteria solid inoculant in different carrier material
  Iis Nur Asyiah, Reginawanti Hindersah, and Rita Harni

Synthesis and characterization of ZnO:Ca²⁺ prepared by simple solution method
  Heraldo Yanindra Pradana, I Made Joni, Liu Kin Men, Yayah Yuliah, Lukman Nulhakim, Vanitha Muthukanan, and Camellia Panatarani

Optical transparency and mechanical properties of semi-refined iota carrageenan film reinforced with SiO₂ as food packaging material
  Afifah Iswara Aji, Danar Praseptiangga, Emma Rochima, I Made Joni, and Camellia Panatarani

Mechanical and solubility properties of bio-nanocomposite film of semi refined kappa carrageenan/ZnO nanoparticles
  Apriliana Eka Saputri, Danar Praseptiangga, Emma Rochima, Camellia Panatarani, and I Made Joni

UV-screening, transparency and water barrier properties of semi refined iota carrageenan packaging film incorporated with ZnO nanoparticles
  Assifa Rahma Khoirunnisa, I Made Joni, Camellia Panatarani, Emma Rochima, and Danar Praseptiangga

The addition of nanochitosan suspension as filler in carrageenan-tapioca biocomposite film
  Emma Rochima, Elisah Fiyanih, Eddy Afrianto, Ujang Subhan, Danar Praseptiangga, Camellia Panatarani, and I Made Joni
Optical Transparency and Mechanical Properties of Semi-Refined Iota Carrageenan Film Reinforced with SiO$_2$ as Food Packaging Material

Afifah Iswara Aji$^{1,4}$, a), Danar Praseptiangga$^{1,}$$^{b)}$, Emma Rochima$^{3,4}$, c), I Made Joni$^{2,}$$^{4,}$$^{d)}$ and Camellia Panatarani$^{2,}$$^{4,}$$^{e)}$

$^{1}$Department of Food Science and Technology, Faculty of Agriculture, Universitas Sebelas Maret, Jl. Ir. Sutami No.36A, Jebres 57126, Surakarta, Central Java, Indonesia
$^{2}$Department of Physics, Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran, Jl. Raya Bandung-Sumedang KM 21, Jatinangor, West Java 45363, Indonesia
$^{3}$Department of Fishery Processing Technology, Faculty of Fishery and Marine Science, Universitas Padjadjaran,
$^{4}$Nanotechnology and Graphene Research Center, Universitas Padjadjaran,
$^{e)}$Corresponding author: c.panatarani@phys.unpad.ac.id

\textit{a)}afifahiswaraiji@student.uns.ac.id, \textit{b)}dpraseptiangga@staff.uns.ac.id, \textit{c)}emma.rochima@unpad.ac.id, \textit{d)}imadejoni@phys.unpad.ac.id

Abstract. Food packaging is important for protecting food from environmental influences such as heat, light, water vapor, oxygen, dirt, dust particles, gas emissions and so on, which leads to decrease the quality of food. The most widely used type of packaging in the food industry is plastic which is made from synthetic polymers and takes hundreds of years to biodegrade. Recently, food packaging with high bio-degradability is being developed using biopolymer combined with nanoparticles as reinforcing agent (filler) to improve its properties. In this study, semi-refined iota carrageenan films were prepared by incorporating SiO$_2$ nanoparticles as filler at different concentrations (0%, 0.5%, 1.0% and 1.5% w/w carrageenan) using solution casting method. The optical transparency and mechanical properties (tensile strength and elongation at break) of the films were analyzed. The results showed that incorporation of SiO$_2$ nanoparticles to carrageenan matrix on optical transparency of the films. For the mechanical properties, the highest tensile strength was found for incorporation of 0.5% SiO$_2$, while the elongation at break of the films improved with increasing SiO$_2$ concentration.

INTRODUCTION

Food packaging is important in protecting food from environmental influences, such as heat, light, water vapor, oxygen, dirt, dust particles, gas emissions and so on, which leads to decrease in the quality of food. The most widely used type of packaging in the food industry is plastic. Plastic is made through a polymerization process with synthetic polymeric material that takes hundreds of years to break down in nature. Packaging with high degree of degradability is being developed to overcome these problems. Recently, the use of biopolymer becomes more interesting due to its properties, which are biocompatibility and biodegradability [1]. But it has been limited because it usually has poor mechanical and barrier properties, which may be improved by adding reinforcing agent (filler) to form composites. But most fillers present a poor interaction with the matrix, which tend to improve by decreasing its dimension to nanoscale (nanoparticles) and produce nanocomposites [2].

Biopolymer matrix which reinforced the particles that have at least one dimension in the nanometer range (1-100 nm) called bio-nanocomposite [3]. One of the natural polymers that can be used in the synthesis of bio-nanocomposite is carrageenan. Carrageenan is gel-forming and viscousifying polysaccharides that are water soluble and obtained by extraction from certain species of red seaweeds. Iota, kappa and lambda carrageenan are three main