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Description of the Visual Image Magnification on Ginger Emulsion using Kappa and Iota Carrageenan

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Abstract

The research was done to describe the visual image magnification on ginger emulsion using kappa and iota carrageenan based on the Scanning Electron Microscope (SEM) with 250×, 500×, 750×, and 1000× magnifications. The freeze dried emulsion were mounted on bronze stubs using double-sided tape and then coated with platinum before being observed. The emulsion consisting ginger (12.5% b/v), carrageenan (2% b/v), and palm sugar (50% b/v) were captured. The result indicated that digital images from ginger emulsion with and without carrageenan were able to be seen clearly and the particle size were able to detected at a range 0.5-5 μm. The lowest magnification of 250 times provided the proper information about aggregation of particles and the particles layer. Large the particle size were able to be less obstructively detected at the image with magnification of 1000x. As conclusion, the magnification was important role for determining the proper image information. The low magnification of 250 times provided beneficial information to obtain the environment of particle while the highest of 1000 times provided proper information to obtain the texture profile properly.

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Introduction

Carrageenan is the one emulsifier agent that was composed of both sulphated or non-sulphated galactose and 3,6-dehydrodylated lactone galactose with the linking of the α-1,3 and 1,4-glycosidic bonds (Dong et al. 2018). The red seaweed may produce the sulphated dependent compound as kappa and iota carrageenan (Siddiqui et al. 2017). Carrageenan has been well studied as hydrogels that are able to be seen on its three-dimensional networks by Scanning Electron Microscopy, or SEM analysis, and may provide high-resolution feature for evaluating various surface phenomena (Tanusorn et al. 2018). Hydrogel features include a high degree of hydration, swelling ability, biocompatibility, and high diffusivity for small molecules (Tanusorn et al. 2018), as well as affinity of water or biological fluids to prepare the next step for physical process (Sharpe et al. 2014). One of commercial product that may use carrageenan as emulsifier is syrup (Panyoyai et al. 2015), and ginger syrup is the common product that was found in Indonesia (Nair 2013). The SEM analysis was a common information to obtain the description about the micro-emulsion, however no information was found to obtain the optimum magnification for proper image. Magnification, various angle, and medium of the SEM analysis are key to obtain the complete information about the physical appearance after treatments (Alnaief, Obaidat, and Mashaqbeh 2018). Therefore this research was done to analyse the magnification of visual image upon SEM analysis for determining the optimum view in order to obtain proper information of SEM image.

Materials and Methods

Emulsion of ginger Graphical display testing according to using the Scanning Electron Microscope (SEM) method. The sample was dried for 24 hours with an evaporator at 40^{o}C. Then it was mashed and emulsion powder was produced. After that, the sample is inserted into the specimen and coated with platinum. The specimens were placed in the specimen stage in a SEM device with a voltage of 20 kV, 14 mm Working Distance (WD) and 1000X magnification.

Our research provided the graphical display of ginger emulsion based on the Scanning Electron Microscope (SEM) analysis according to the previous researcher's method using JEOL JSM-6510LA. The emulsion consisting ginger (12.5% b/v), carrageenan (2% b/v), and palm sugar (50% b/v) were captured using a scanning electron microscope, SEM (JEOL, model JSM-6460LV, Tokyo, Japan) using the previous researcher's method (Nur Hanani and Aelma Husna 2018). The freeze dried emulsion were mounted on bronze stubs using double-sided tape and then coated with platinum before being observed under the microscope with 250×, 500×, 750×, and 1000× magnifications. The specimens were placed in the specimen stage in a SEM device with a voltage of 20 kV, 14 mm working distance.

Result and Discussion

The result indicated that digital images from ginger emulsion with and without carrageenan were able to be seen clearly and the particle size were able to detected at a range 0.5-5 μm. However large the particle size were able to be unobstructed detected at the image with magnification of 1000 times. Furthermore, the variation of particle size was hindered when the data obtained in the maximum signification.

The lowest magnification of 250 times provided the proper information about aggregation of particles and the particles layer. The sugar appearance were clearly seen on this magnification if compare with larger zoom. Thus, since the particles and its environment might be a key role for determining the mechanism of physical binding, the lowest magnification on this experiment might be required. This is in line with the finding of previous researcher that mention the low magnification sometimes provides the important information for texture profile (Pratama et al. 2018).

The sample with iota carrageenan provided the information of separation among particles and it could not be seen clearly on the sample with kappa carrageenan. Since the edge of particle might be seen clearly in the iota samples, this may provide the conclusion that iota generate better emulsion stability due to the larger size of surface area. This finding was linear with previous finding that emulsion with iota provide the stickiness due to the wide of surface binding (Al-Baarri et al. 2018).

Conclusion

As conclusion, the magnification was important role for determining the proper image information. The low magnification of 250 times provided beneficial information to obtain the environment of particle while the highest of 1000 times provided proper information to obtain the texture profile properly.

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