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PRODUCTION & MANUFACTURING | RESEARCH ARTICLE

Distinguished identification of halal and non-halal animal-fat gelatin by using microwave dielectric sensing system

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Abstract: Halal has been a long-disputed issue due to the reason of its complexity consequently of swift advancement in innovation and technology. Gelatin plays a vital role in modern food processing as it has been used in many food preparations and is commonly used to make the pharmaceuticals capsule these days. In this work, various types of animal fat will measure dielectrically to distinguish them for the development of the detection system. This project applied the measurement of reflection coefficient by using the high-temperature probes. These probes use the principle of microwave method and allow the measurement to be made in a fast and non-destructive way. For this project, the high-temperature probe is used to measure the sample of animal fat for instance chicken, beef and pork fat. The fresh animal fat was used and the moisture content of the animal fat was manipulated by using the oven-drying technique. The different levels of moisture content inside the fat will affect the measurement value of reflection coefficient as the moisture content will change the dielectric properties of the animal fat. The measurement of reflection coefficient was made with a network analyzer in the frequency range of 0.2 GHz to 20 GHz. From the experimental result, it can be concluded that pork fat shows distinguishable trend compared with chicken and beef fat which perform

ABOUT THE AUTHOR



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Kit Yeng Sin is a PhD scholar. She has successfully completed Doctoral degree in Management, Master's degree in Engineering Management as well as Bachelor of Engineering (Honors) in Biomedical Electronics Engineering at Universiti Malaysia Perlis (UniMAP). With a diversified educational portfolio, she was able to tackle all aspects of her research work, whether technical or intellectual, with determination.

She had an active role during the research development as well as a prominent role towards the completion of this research. Besides that, she was also a member of professional affiliations such as Board of Engineer Malaysia (BEM), International Society for Development and Sustainability (ISDS) as well as Akademika Nusa Internasional (Association of Social Sciences and Humanities) (ANISSH).

PUBLIC INTEREST STATEMENT

Halal is not only constrained for religious matter but should also be applied for other life applications as it brings out a lot of benefits. Furthermore, halal has long been a prevailing issue in the field of food-related safety research. Notwithstanding, there remains a general paucity of research in identifying the specific form of halal and non-halal product, such as the animal fat gelatin. At present, the existing studies on identification of animal fat gelatin emphasize on the demand side, but studies on the technical side are scarce and largely inconclusive. This study carried out an identification of various halal and non-halal animal-fat gelatin by utilizing microwave dielectric sensing system. This method is believed to distinguish halal and non-halal animal fats by observing their distinguishable trend of reflection coefficient, dielectric constant and dielectric loss throughout the frequency range from 0.2 GHz to 20 GHz with a network analyzer.

similar trend in variation of reflection coefficient ($|S_{11}|$), dielectric constant (ϵ') and dielectric loss (ϵ'') throughout the frequency range from 0.2 GHz to 20 GHz.

Subjects: Food Science & Technology; Food Engineering; Food Biotechnology; Food Chemistry

Keywords: Halal; dielectrically; reflection coefficient; high temperature probe

1. Introduction

Nowadays, many people are concerned about their health and are taking supplements such as Vitamin E or fish oil and the list goes on in order to increase the immunity of their body and make them stronger (Ab Halim et al., 2014). Hence, the soft gel capsules will probably be encountered. These capsules have an appealing look and a smooth finish that make them easier to swallow. According to Capsugel, a major manufacturer of capsules, most soft gel capsules are made from gelatin (Gmia, 2012). The word gelatin is taken from the Latin “gelatus” which means rigid or frozen wherein the main sources are from animal skin especially pigskin and lard (Mohd Salleh et al., 2013). Due to this fact, gelatin capsules are not suitable to be taken by people who hold a strong religious value that prevent consuming certain animals for certain religious reasons (Smith et al., 2011).

Lately, in May 2014, Malaysia Health Ministry announced that pig DNA is identified in samples taken from Cadbury’s Dairy Milk Hazelnut and Dairy Milk Roast Almond products, and shockingly spark uproar and create chaos among local Muslim groups. Following the incident, some Muslims might address lingering doubts over Cadbury’s product while some of the radical Muslims might start hesitating about the halal certification and halal status for the products that are predominantly approved by Malaysian Islamic Development Department (JAKIM). Owing to that, more than 20 Malay-Muslim groups have asked for a nationwide boycott on all Cadbury products, claiming that a holy war needs to be instigated against the confectionery for allegedly attempting to “weaken” Muslims in Malaysia (The Malays Mail Online, 2014). Besides the Cadbury chocolates, other products proclaimed to contain pig DNA include Pure Creamery Butter-Golden Churn butter used in Sarawak’s layer cakes. The Sarawak Islamic Religious Department’s finding on 19 July 2011 left a vast impact on the industry as the butter’s manufacturer, Switzerland-based Ballantyne Food, admitted its products contained pig DNA (The Malaysian Insider, 2014).

Furthermore, Director of The Federation of Malaysian Consumers Associations (FOMCA), Mohd Yusof Abdul Rahman stated that the major problem in Malaysia is that many users do not bother attitude about the products they are purchasing. Yet, they are not sensitive enough and only received medication prescribed to them. Hence, FOMCA has collaborated with the Ministry of Health (MOH) to provide “Know Your Medicines” campaign to ensure consumers are aware of the substance of medications they consume (Pensioen & Blonk, 2010). Subsequent to the campaign, it verified that about 30% of the 100 health products tested in the laboratory of Pharmaceutical Sciences Universiti Sains Malaysia (USM) is not halal as the gelatin capsule originated from pigs. The Dean Prof Dr. Syed Azhar Syed Sulaiman said all the products tested over the last year were sent by the National Pharmaceutical Control Bureau and the product manufacturer to ascertain the source of gelatin that they use. He then added that out of the 100 products that were tested, 30% are unlawful to use gelatin from pork as it is cheaper than beef gelatin (Non-halal Medicine, 2013).

In addition to that, deputy dean of Initiative Studies, IIU Studies Management Centre, Prof Dr. Irwandi Jaswir noted that there is a strong demand for gelatin in the production of various food, health and cosmetics products as Muslim population is getting expanded lately. Nevertheless, it has become a sensitive issue as 95% of the gelatin in the market now is produced from animals prohibited for use by Muslims (The Star Online, 2012). According to the Minister in Prime Minister Department, Dato Seri Jamil Khir Baharom, there are many manufacturers of health products which do not apply