Detection of Irradiated Food using Photostimulated Luminescence (PSL) Technique.

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ABSTRACT

The Photostimulated luminescence (PSL) method may in principles be applied to detect irradiation of any foods which contain mineral debris, especially silicates mineral and bioinorganic materials such as calcite, which originate from shells or skeleton. These materials store energy in charge carriers trapped at structural interstitial or impurities site. When exposed to ionizing radiation optical stimulation of minerals release charges carriers. In PSL measurements, whole samples or a mixture of organic and inorganic materials can be used. The finding of this study will be useful to facilitate control of food irradiation application in Malaysia.

INTRODUCTION

Treatment with ionizing radiation is a well established technique to extent the food shelf life to reduce the food related hazard caused by pathogenic organism (Kashif A., et al., 2012). At present radiation treatment is permitted for various categories of food and food ingredients in many countries (Kume, et al., 2009). To allow consumers to exercise a free choice as to which food they wish to purchase, labeling of the products and requirement to implement methods to detect treatment with the ionizing radiation at the product marketing stage. PSL method may in principal be applied to detect irradiation of any foods which contain mineral debris especially silicate minerals and bioorganic materials such as calcite. This technique is based on the fact that the irradiated sample emits light in the range 300 – 400 nm. The amount of light which is the result of a PSL measurement can reveal a previous irradiation of the product. PSL is not a conclusive techniques, it is mostly used as a screening tool to identify irradiated food (Liwen, et al., 2013).

METHODS

PSL measurements were performed as described by European Standard (EN 13751:2009) using a SURRC PPSL Irradiated Food Screening System.

DISCUSSION

Wide range of foods with minerals examples herbs and spices, shellfish, fruits and vegetables, cereals, bulbs and tubers can be used to detect irradiated or unirradiated. Minimally sample preparations is needed. To minimize signal bleaching effects, irradiated samples should be kept in subdued light when in use and in darkness when not in use.

CONCLUSIONS

PSL system is particularly suited to the investigation wide range of foods with minerals such as herbs, spices, seasonings, fruits and vegetables, shellfish, meat products, cereals, bulb and tubers. PSL measurement do not destroy the sample, therefore measurement can be made repeatedly. It provides rapid, low cost methods for screening a wide range of food types to determine whether these have been irradiated. The system is typically able to recognize more than 95% of irradiated herbs and spices.

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