



Contribution ID: 214

Type: Poster

Biopolymer-Silver Nanoparticle as a CIELAB Colour Space Dosimeter

Thursday, 27 April 2017 14:15 (2 hours)

A new purpose of silver nanoparticles (AgNPs) in chitosan (CS) biopolymer is proposed as a radiation dosimeter for application in the dose range of food irradiation. The biopolymer-AgNPs are simply prepared from AgNO_3 precursor and CS (DD =90%, $M_v = 580$ kDa) aqueous solution. The optimum formula of biopolymer-AgNPs dosimeter was studied.

A series of the prepared biopolymer-AgNPs dosimeter relatively response by colour changing to the electron beam irradiation doses.

With this system, the colours were measured in a CIELAB colour space using a colourimeter. The biopolymer-AgNPs dosimeter is exposed to various irradiation doses ranging from 0 to 10 kGy. Based on CIELAB colour space, the colour of biopolymer-AgNPs dosimeter is changed from white to yellow and dark brown by irradiation. The numerically measured colour is presented in the CIELAB colour difference (ΔE_{ab}). The relationship of dose and colour showed that ΔE_{ab} linearly increased with irradiation dose.

The colour change is due to the particle size of biopolymer-AgNPs dosimeter. The colours from the developed biopolymer-AgNPs dosimeter can be applied using general purpose scanner and the measured colours were then calculated to their corresponding radiation doses. The biopolymer-AgNPs dosimeter is expected to be a simple, economical, effective and alternative device as the food irradiation dosimeter.

Country/Organization invited to participate

Thailand

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Session Classification: P-A2

Track Classification: IRRADIATION FACILITIES