

## Effect of inactivation on *Escherichia coli* on the treatment chamber materials and packaging materials in intense pulsed light treatments

**SHIN J. (1), LEE G. (2), JUAN P. (3), INJAE P. (2)**

1 Department of Korean Cuisine, Jeonju University, Jeonju, Korea (Republic of)

2 Department of Culinary & Food Industry, Jeonju University, Jeonju, Korea (Republic of)

3 Umji Food Co., Ansan, Korea (Republic of)

In this study, the inactivation effect of intense pulsed light as the treatment chamber materials and packaging materials was investigated. The UV-C light amount of the light source of the control was  $3.595\text{W}/\text{m}^2$ . The UV-C light quantity of quartz with a thickness of 1mm was  $3.356\text{W}/\text{m}^2$ , acrylic  $0.878\text{W}/\text{m}^2$ , and glass  $0.06\text{W}/\text{m}^2$ , and the light transmittance was 93.4% for quartz, 24.4% for acrylic, and 1.7% for glass. As for the bactericidal effect on the materials of treatment chamber, quartz showed the same inactivation effect as the control regardless of thickness of material. A 1 mm thick acrylic showed a killing effect of 1.1log after 60s, and 5.0log after treatment for 180s. Glass had no sterilization effect regardless of its thickness. All of the death curve pattern except for glass showed a bi-phasic form. For the death rate constant and D-value, the  $k_1$  was  $0.287\text{s}^{-1}$ ,  $k_2$  was  $0.072\text{s}^{-1}$ , the  $D_1$ -value was 8.02s and the  $D_2$ -value was 31.87s. and the death rate constant and D-value. D values were  $D_1=8.11\text{s}$ ,  $D_2=33.87\text{s}$  for quartz,  $D_1=127.94\text{s}$ ,  $D_2=54.83\text{s}$  for acrylic, and  $D=575.75\text{s}$  for glass. According to the measurement of the light penetration rate of each container packaging material in pulsed light treatment, there were differences in the UV-C penetration rate depending on the materials as the rate of PP, OPP, PE and PET was 91.3%, 89.7%, 89.5% and 1.8%, respectively, against the control groups. In terms of the containers made of 20? thick PP, around 6log of bacteria were killed after 20s treatment, and all bacteria were killed after 60s treatment. In terms of the containers made of 30? thick OPP and PE, 6log of bacteria were killed after 30s treatment, and all bacteria were killed after 60s treatment. PET had lower sterilization effects than other packaging materials. As the packaging materials thickened, the light penetration rate tended to be decreased, but did not have significant differences, except for PET. The study found that quartz has the highest sterilization effect among the materials of treatment containers in pulsed light treatment, and PP is the best material for food packaging containers.