

A Review :

Pulsed light method of food preservation

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ABSTRACT

The demand for high quality food products is growing rapidly these days. A natural taste and a fresh-like quality as well as safety of food are highly appreciated. In an effort to meet these demands, different non-thermal food preservation techniques are being developed. Pulsed light is one of the mild preservation techniques that can meet these criteria. A system generating light pulses consists the power unit and the lamp. The power unit generates high voltage to charge a capacitor. Once it is charged, a high voltage switch discharges the energy from the capacitor to the lamp, which energizes the lamp and is converted to broadband white light pulse. Each pulse lasts for 1 millisecond to few milliseconds. Although the peak power is very high the process is relatively economical compared to conventional sterilization processes due to the very short processing times. Although lot of research and further development is needed, technology shows promise as prominent non-thermal method of food preservation.

Key words : Pulsed light, Non thermal, Preservation

Minimally processed, fresh-like products have become common place in the food industry as a result of consumers preference for high quality, yet minimally processed, additive-free and microbiologically safe foods. The industry is developing alternatives to the use of heat preservation to eliminate or reduce levels of bacteria in foods. Heat treatment destroys the functionality and flavours of many foods. Non-thermal processes offer an alternative. Perhaps, consumer preferences are currently moving towards easily prepared food, less severely processed food (vitamins and nutrients preserved), natural food (without preservatives and other artificial additives), healthy products (functional food, low in fat, less salt), and more secure.

According to Spanish research company AZTI, research and development regarding food preservation is directed in two main directions, towards non-thermal treatments, such as high pressures, pulsed light, pulsed electric field, irradiation, use of modified atmospheres and bio-preservatives, and towards improved thermal treatments, such as ohmic warming or microwaves.

In high hydrostatic pressure method foods are treated under high pressure up to 6000 atm, by placing them in a medium, usually water in a thick-walled vessel, and compressing the medium for several minutes. Electron beams technology focuses around a high-powered accelerator, a cathode ray tube similar to that found in a television set. The beams hit microbe's DNA and deactivate it. Dielectric heating is used in the plywood industry to heat glue between the layers of wood.

Irradiation is the method to kill bacteria in beef products. Bio-preservatives utilize their antagonism against pathogenic microorganisms. Pulsed electric field processing involves the application of pulses of high voltage (typically 20 - 80 kV/cm) to foods placed between two electrodes.

Definition and description

Pulsed light is a method of food preservation is the application of intense and short duration pulses of broad-spectrum called "white light" (approximately 20,000 times more intense than the solar light on the earth surface) for very short time (ranging from 1 μ s to 0.1 s).

The spectrum of white light for treatment includes wavelengths in the ultraviolet (20 - 380 nm) to the near infrared region (780- 10⁵ nm). The material to be treated is exposed to a least 1 pulse of light having an energy density in the range of about 0.01 to 50 J/cm² at the surface. A wavelength distribution such that at least 70% of the electromagnetic energy is within the range from 170 to 2600 nm is used. The material to be sterilized is exposed to at least 1 pulse of light (typically 1 to 20 flashes per second) with a duration range from 1 μ s to 0.1 second (Dunn *et al.*, 1991, 1995). The pulsed light method is a relatively new technique. The US Food and Drug Administration approved it for certain applications after being evaluated for both safety and effectiveness.

MacGregor *et al.* (1998) described the power light source suitable for inactivation of micro-organisms. The test assembly used for experiments consisted of a