

Bacterial inactivation using low temperature plasmas

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Utilizing an ionized gas (plasma) to achieve sterilization could be an alternative to conventional methods. The plasma process has several advantages: a sterilization time shorter than the actual processing time required with steam autoclave and dry heat methods (approx. 60 min); a lower processing temperature (60 °C or less); the possibility of dealing with a wide range of materials and objects; harmless operation for operators, patients and materials. The method consists in exposing microorganisms to plasma produced by an electrical discharge in a gas. In a plasma discharge various components act on the microorganisms by the physical effects (UV radiation and charged particles) and chemical effects (chemically active radicals). Both low and atmospheric [1] pressure plasma discharges can be used, of course, each of them with its peculiarities. In this contribution we report on two experimental studies of microorganisms inactivation by plasma processes at low and atmospheric pressure. At low pressure, optimal plasma conditions for *Staphylococcus aureus* were found, and a reduction of 4 log in a few minutes of the bacterium proves the applicability of an industrial grade plasma sterilization reactor. At atmospheric pressure, a plasma jet was applied for the surface decontamination of fresh food like salad. The treatment induced fast (a few seconds) microbial decontamination.

[1] M. Pedroni et al., J. Vac. Sci. Technol. B 36(1), Jan/Feb 2018