#40

MICROBIAL INACTIVATION USING COLD ATMOSPHERIC GAS PLASMAS

X. T. Deng[a], J. J. Shi[a], G. Shama[b] & M. G. Kong[a]

[a] *Dept of Electronic and Electrical Engineering, Loughborough University, LE11 3TU, UK*
[b] *Dept of Chemical Engineering, Loughborough University, LE11 3TU, UK*

ABSTRACT

The ability of cold atmospheric pressure gas discharges to inactivate microorganisms has been demonstrated in a number of previous studies. However, most of this work has been performed using microorganisms that do not form biofilms and with the microorganisms supported on abiotic surfaces that discourage cell growth. When microorganisms attach to the surface of a food they can extract nutrients from the food and proliferate at the surface. Often this growth takes the form of biofilms which comprise 3-D networks of polysaccharides that attach microorganisms to surfaces and serve to protect them from external stresses; fresh foods, such as salad crops, frequently harbor biofilms. We believe that the use of cold atmospheric plasmas (CAP) offers a potential for inactivating microorganisms on the surface of fresh foods that cannot be readily treated by other methods without inducing unacceptable changes to these foods. As a first step towards a full evaluation of the viability of the CAP technology for food safety control, we consider in this paper two key issues, namely (a) whether atmospheric glow discharges can inactivate biofilm-forming microorganisms; and (b) whether plasma treatment causes significant discoloration to food surfaces. Using the biofilm-forming bacterium *Pantoea agglomerans* and bell peppers (*Capsicum annuum*) as a typical example of plant tissue, we show that atmospheric He-O_2 plasmas can be effective inactivation agents without causing unacceptable levels of discoloration to the peppers, and that furthermore they are superior to the use of low pressure UV sources.