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Inactivation of *Escherichia coli* using atmospheric pressure non-thermal plasma of diffuse coplanar surface barrier discharge

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The effects of non-thermal plasma sources such as plasma jets and dielectric barrier discharges on biological systems are nowadays widely studied for their potential applications in the field of plasma medicine [1]. Reactive species, UV radiation and electric field generated by non-thermal plasma sources provide sterilization, decontamination or wound healing effects [1, 2, 3].

The source of atmospheric-pressure plasma based on the Diffuse Coplanar Surface Barrier Discharge (DCSBD) generates macroscopically homogeneous plasma in ambient air [4]. The non-thermal character of DCSBD plasma allows treatment of thermally degradable and biocompatible planar materials often used in medical applications. The DCSBD plasma interaction with microorganisms was successfully tested for inactivation of chosen fungi on artificially infected plant seeds [5].

In the presented work we investigated the inactivation of *Escherichia coli* bacterial contamination on Polytetrafluoethylene (PTFE) surface in ambient air at atmospheric pressure. The germicidal efficiency of DCSBD plasma short time exposition (less than 1 min) was evaluated by standard microbiological cultivation (CFU plate counting). The test of DCSBD plasma assisted inactivation process was repeated at different distances of the contaminated PTFE sample from the active plasma layer. The bactericidal species produced by the DCSBD plasma were investigated by Fourier transform infrared (FT-IR) and optical emission spectroscopy (OES) measurements. The changes of the cell morphology after plasma treatment were observed by Scanning Electron Microscopy.

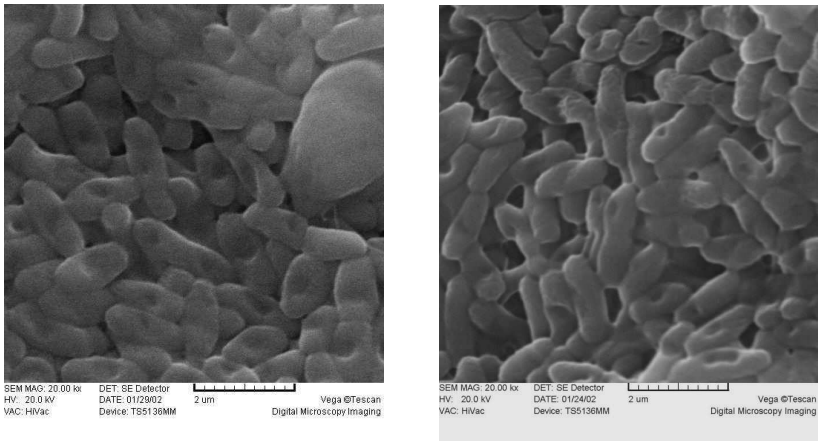

Fig. 1 SEM images of Escherichia coli bacteria before (left) and after DCSBD plasma treatment (right).

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