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Investigations on the antimicrobial effect and the surface modifications on cutting blades by atmospheric plasma jet treatment

Antje Lehmann[1], Thomas Arnold[2], Thiemo Albert[3], Anna J. Dittrich[3], Peggy G. Braun[3]

[1]Leibniz Intitute of Surface Engineering, Leipzig, Germany [2]Leibniz-Institute of Surface Engineering, Leipzig, Germany [3]University of Leipzig, Leipzig, Germany

antje.lehmann@iom-leipzig.de

Manufacturers in food industries needs to ensure high process hygiene, including effective as well as product-, material- and resource-friendly technologies for the decontamination of cutting blade surfaces. There still exist unsolved problems in the production of cold cuts, with regard to the avoidance of bacterial recontamination in the cutting process itself.
First experiments show the potential of atmospheric plasma jets as an alternative method for decontamination of cutting blades in food industry. For antimicrobial treatment, a variety of plasma devices are described in the literature regarding their type of ignition and the process gas used. The main reasons for the antimicrobial effect of such plasma jets are the reactive oxygen species (ROS) and nitrogen species (RNS) generated in the plasma.
Within this project* the antimicrobial effect of atmospheric plasma jets generated by different process gases (He, Ar, He/Ar mixture and O_2) on cutting blades, artificially contaminated with Listeria monocytogenes, Lactobacillus sakei or Serratia liquefaciens, were evaluated. ROS and RNS are detected on a microwave-driven atmospheric plasma jet by means of optical emission spectrometry (OES). In parallel, the cutting blade surface conditions after plasma treatment with respect to hardness and elasticity of the material are investigated.
The OES spectrum shows clearly that RNS and ROS intensities are changed with the variation of mixing ratios of He and Ar and the admixture of O_2. The impact of these findings on the bacterial inactivation will be further examined. Results will be presented and discussed.
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