

**FORMATION OF REACTIVE SPECIES AND  
BIOLOGICAL EFFECTS RESULTING FROM LIQUID  
TREATMENT BY ATMOSPHERIC PRESSURE  
PLASMA\***

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DBD plasma treatment of non-buffered water based liquids under atmospheric conditions resulted in microorganism inactivation accompanied by acidification as well as generation of nitrite, nitrate, and hydrogen peroxide<sup>1</sup>. In an additional study, microorganisms were incubated with sodium chloride solution immediately as well as 30 min after DBD plasma treatment of the liquid. An effective inactivation was found under these conditions, too. These results led to the conclusion that microorganism inactivation was caused mainly by stable reactive species generated in the liquid as a result of plasma treatment. More detailed investigations using variable liquid volumes and surfaces demonstrated that acidification as well as generation of nitrite, nitrate, and hydrogen peroxide proceeds at the gas-liquid interface. A subsequent distribution in the bulk liquid seems to be caused both by diffusion and convection processes. However, addition of nitrite, nitrate, hydrogen peroxide or acid alone or as mixtures to microorganism suspensions did not cause any biological effects. Using additional results of liquid treatment by atmospheric pressure plasma in an argon enriched atmosphere instead of air, possible mechanisms as well as stable reactive species being responsible for biological effects like microorganism inactivation are discussed.

1. K. Oehmigen, M. Hähnel, R. Brandenburg, Ch. Wilke, K.-D. Weltmann, Th. v. Woedtke, "The role of acidification for antimicrobial activity of atmospheric pressure plasma in liquids", *Plasma Process. Polym.*, in press

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