

## Antimicrobial Activity of SDBD Plasma Treatment on Planktonic and Biofilm Forms of *Escherichia coli*

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By using a water solution as a discharge electrode, it is possible to combine the basic features of both water discharges and surface dielectric barrier discharges (SDBD) [1]. The benefit of such a combination lies in obtaining highly oxidative plasma in contact with liquid without problems of electrode erosion. The SDBD is generated from the contact line between the liquid electrode, air, and dielectric material (tube). Such combined systems were used for plasma activations of hollow object surfaces [2], which performed splendidly in achieving uniform plasma treatment of the inner surface of fine tubes.

This study investigated several approaches to plasma interaction with bacteria. The first scenario is the effect of plasma on the liquid contaminated with planktonic bacteria *E. coli* (CCM 3954). Various power inputs and treatment times were investigated. The second approach is to determine the effect of plasma treatment on *E. coli* 48h biofilms deposited on the inner surface of polymeric tubes. In the third approach, the plasma pre-treatment of polytetrafluoroethylene (PTFE) tubes before biofilm formation was performed (Figure 1) to investigate its ability to change the microbial surface adhesion and therefore influence biofilm maturation by changing the surface properties of the PTFE tubes.

Our results show that plasma treatment reduces microbial water contamination, impedes the biofilm formation process, and decreases the biomass of the mature biofilm.

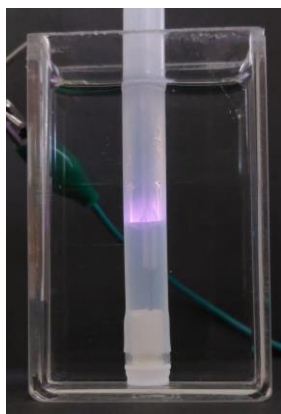


Fig. 1. A photo of the PTFE tube during plasma pre-treatment.

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### References

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