

## PHYSICAL APPLICATIONS IN LIFE SCIENCE

K.-D. WELTMANN, T. GERLING, J. F. KOLB and Th. von WOEDTKE

*Leibniz Institute for Plasma Science and Technology e. V. (INP Greifswald),  
Germany*

*E-mail weltmann@inp-greifswald.de*

**Abstract.** The properties of plasma and its generated cocktail of physical and chemical compounds leads to significant microbial inactivation on various specimens and offers a wide range of possible applications for decontamination purposes. Actually e.g. caused by Covid-19, an increasing demand also for new and sufficient decontamination methods offers the chance for selected plasma based applications of surfaces. Further selected components of the plasma influence cell signalling, apoptosis and other cellular processes. Studies on the decontamination of surfaces, gases, liquids, on the treatment of seeds and plants as well as the experience and knowledge acquired in the new field plasma medicine are the starting point and basis of several new disciplines like "Plasma Agriculture", "Plasma Cosmetics", "Plasma Pharmacy/Pharmacology", "Plasma Oncology" just to mention the most actual research activities. Applications for healing of chronic wounds and cancer treatment become a more and more important and clinically relevant research field in plasma medicine (Metelmann et al. 2018, Schuster et al. 2016). The sophisticated biomedical applications of plasmas require atmospheric pressure plasma sources, which are now available in many different designs and configurations (von Woedtke et al. 2013). First devices especially for wound healing are certified as medical products class II. Because of other devices, which enter the market partly without clinical trials or with poor physical and biological characterization, there is clearly a need for standard parameters. With the help of standards, plasma sources can be perfectly adapted to dermatological and other medical applications and will achieve higher acceptance. Such a pre-selection criteria ensure the safety of investigators, patients and therapists. A well-known and applicable standard also guarantees the identification of devices that are not suitable as medical plasma sources, DIN 2014. One focus of the contribution – besides medicine - will be agriculture. The lecture also discusses different plasma sources and applications and shows selected results with regard to the current state of application.

### References

- DIN SPEC 91315:2014-06, 2014, *General requirements for plasma sources in medicine*, DIN Deutsches Institut für Normung e.V., Beuth Verlag Berlin (in German).
- Metelmann, H. R. et al. (eds): 2018, *Comprehensive Clinical Plasma Medicine*, Springer Nature.
- Schuster, M. et al.: 2016, *Visible Tumor Surface Response to Physical Plasma and Apoptotic Cell Kill in Head and Neck Cancer*. *J. Cranio. Maxill. Surg.*, **44**, 1445.
- von Woedtke, Th., Reuter, S., Masur, K., Weltmann, K.-D.: 2013, *Plasmas for medicine*. *Phys. Rep.*, **530**, 291-320 (a).