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## Plasma in cosmetic applications: possibilities and boundary conditions

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Application of cold atmospheric plasma (CAP) in wound healing has reached the state of clinical application. Its effectiveness particularly in reconstitution of healing processes of chronic wounds is based on its ability both to inactivate wound contaminating microorganisms and to stimulate tissue regeneration processes directly and based on non-thermal modes of action. With reference to this successful implementation of CAP application above all in dermatology, more and more plasma applications for cosmetic purposes are offered. Beside the fact that an undisturbed wound healing under certain circumstances can also include cosmetic aspects, cosmetic plasma applications are mostly directed at skin rejuvenation, wrinkle reduction etc. Due to the actual state of knowledge, such plasma effects on skin are at least partially caused by thermal plasma action. Consequently, any reference to the actual knowledge on medical CAP application and its well-investigated safety which is published in textbooks yet (see e.g. [1]), does not appear readily allowable.

In order to develop the promising potential of plasma application in cosmetics, too, similar to the medical plasma application, some basic criteria for plasma device characterization should be defined. A transparent documentation of such characteristics will improve the acceptance of plasma application in cosmetics and will improve the safety of clients using such offers. To define such basic characterizations, the German pre-standard DIN SPEC 91315 "General requirements for plasma sources in medicine" [2,3] could serve as a model.

### References:

[1] H.-R. Metelmann, Th. von Woedtke, K.-D. Weltmann (eds.). Comprehensive Clinical Plasma Medicine. Cold Physical Plasma for Medical Application. Springer, 1st ed. 2018

[2] DIN SPEC 91315:2014-06, General requirements for plasma sources in medicine. DIN Deutsches Institut für Normung e.V., Beuth Verlag Berlin 2014 (in German).

[3] M.S. Mann, R. Tiede, K. Gavenis, G. Daeschlein, R. Bussiahn, K.-D. Weltmann, S. Emmert, Th. von Woedtke, R. Ahmed. Introduction to DIN-specification 91315 based on the characterization of the plasma jet kINPen® MED. Clinical Plasma Medicine 4 (2016) 35-45.

