

Plasma Applications to Sterilization and to Aesthetics

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Low-temperature plasmas interacting with living tissues or germs have shown their best applications to sterilization in the past decade or two. Their commercial attractiveness will be enhanced greatly with the use of compact low-cost nonthermal air plasmas using less hydrogen peroxide [1]. The ozone reduction issues in air plasmas have to be resolved beyond the present level of using charcoal or catalyst. Compared with lasers, plasmas also have many advantages in other applications such as aesthetics: oral and skin cares. Plasma treatment to bacterial plaque located in oral tissues is effective in killing only pathogens without damaging normal tissues [2]. Since oral diseases are not caused by only one pathogen, Ar or He atmospheric plasma should demonstrate the removal of various oral pathogens at the same time. Along with sterilization, plasma can also enhance blood coagulation and wound healing, relating to cell stimulation. Treatment with compact microwave plasmas showed enhanced expression of anti-aging genes in skin cells, collagen, fibronectin and vascular endothelial growth factor without causing cell death with reduced E-cadherin [3]. The characteristics of these plasmas [4] driven by various power sources, esp. from dc to portable microwave modules are modeled by various methods [5]. Plasma devices with several pending issues resolved can have great potential for oral and skin cares as well as for sterilization. The challenging plasma issues are oriented around the design of compact low-cost Ar or He plasmas with sufficiently low gas consumption or air plasmas with drastically reduced ozone production. The biomedical issues are equally formidable.

References

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