Excimer light sources for sterilization of thin cavities in industrial application

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New excimer light sources are presented which emit around 172nm or 222nm. With these sources, a new packaging sterilization process for the food and medical branches can be realized.

Based on research and knowledge of fundamental sterilization mechanisms, research and development of excimer sources emitting around 172nm and 222nm is performed. The sterilization capability of these thin excimer light sources is tested and optimized using standard microorganisms like bacterial spores of B.atrophaeus und fungal spores of A.niger. The samples are contaminated with at least $10^5$ spores. With these parameters, a sterilization process time of a few seconds to deactivate microorganisms is achieved.

In application, the developed light sources for sterilization have no need of chemicals and no residua are left in the package. No water for preparing or afterwards cleaning is necessary. Clock rates of modern packaging and filling machines can be reached because of a short treatment time with these light sources. In this time scale, the heat load to the package is low. So, sterilization of thin cavities made from modern packing materials like PET, PS and PP is possible. Additionally, the energy consumption for the sterilization process with excimer sources is only 10% of the common hydrogen peroxide process.

The new excimer light sources for packaging sterilization are designed e.g. like a lamp with a quartz bulb for 360° emission and equipped with a base for simple handling. The power supply is separated from the excimer source for an easy installation into machines. The compact design and resulting lower footprint compared to other sterilization processes is another advantage in production environments with high demand on cleanliness.

In summary, the presented excimer sources have a competitive performance and several advantages to be a serious and especially an environmental friendly alternative for common packaging sterilization processes.

Keywords
sterilization
packaging
PET
UV
spores