

Cold Atmospheric Plasma Device for Decontamination of Space Equipment

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Cold Atmospheric Plasmas (CAP) are commonly used in plasma medicine and plasma hygiene due to its sterilizing conditions. We are presenting a new device based on the circulation of the long-living species of an afterglow air CAP for the decontamination of space equipment. In space exploration the decontamination of equipment for the visit to other planets or moons is very strictly regulated through the planetary protection policies of the Committee on Space Research (COSPAR). Proven methods for the decontamination are using for treatment of the equipment dry heat or H₂O₂-gas, both having negative side effects in addition to the decontamination efficacy.

In a first project we investigated the use of afterglow plasma produced in a CAP for the decontamination effects on bacterial spores [1]. The afterglow plasma contains only the long-living species like ozone, NO₂, etc. which allows the treatment of very sensitive materials at room temperature. In a follow-on project the apparatus was completely redesigned to gain efficacy, stability and reproducibility.

Measurements of the decontamination efficacy combined with physical measurements of the produced reactive components (measured by FTIR and UV absorption spectroscopy) and their effect on treated materials allow a better understanding of the involved processes.

We will give an overview on the status of the plasma decontamination project funded by the Bavarian Ministry of Economics.

[1] Shimizu, Satoshi, Barczyk, Simon, Rettberg, Petra, Shimizu, Tetsuji, Klaempfl, Tobias, Zimmermann, Julia L., Hoeschen, Till, Linsmeier, Christian, Weber, Peter, Morfill, Gregor E. and Thomas, Hubertus, *Cold atmospheric plasma - A new technology for spacecraft component decontamination*. Planetary and Space Science, 90, Seiten 60-71. Pergamon-Elsevier Science Ltd. (2014).