INVESTIGATION ON THE STERILIZATION MECHANISMS OF A DOUBLE INDUCTIVELY COUPLED PLASMA

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Gentile plastic materials used for medical implants are a challenge for common sterilization processes which are either too hot or toxic. Plasma sterilization promises a way to achieve cold, gentile and fast sterilization of medical objects. Different sterilization mechanisms inside a plasma are known: radicals, ion bombardment and radiation. Radicals etch the spore coat, ions with enough energy break bonds, UV and VUV photodesorption can produce volatile species in the spore coat. This can lead to cell death during proliferation. Additionally, radiation below 275 nm can cause strand breaks in the DNA. This contribution focuses on sterilization caused by radiation in the range of 110 - 450 nm. Sterilization results are presented to show the efficiency of optical emission as an important sterilization mechanism in plasmas.

Experiments were carried out in a low pressure double inductively coupled plasma reactor[1]. Samples of different bacterial and fungal spores such as *B. atrophaeus* or *A. niger* are used. These spore are treated at different plasma parameters as well as the spores are covered by different cut-off filters in order to determine the radiation dependency of these spores in the UV range.

Residual proteins on used and sterilized medical tools are a concern regarding patient safety[2]. Reactive species inside a plasma offer a possible method to remove these residuals[3]. Bovine serum albumin (BSA) is used as a model protein to determine the etch rate of the sterilization processes.

1. H. Halfmann et al.: J. Phys. D: Appl. Phys. **40** (2007) 4145-4154
2. Murdoch et al.: J. Hosp. Infec. **63** (2006) 432-438
3. O. Kylián et al.: J. Phys. D: Appl. Phys. **41** (2008) 95201-95208