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New methods for reprocessing of medical devices based on plasma treatment

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The rapid progress in the development of new devices for minimal invasive surgery leads to more complex and fragile instruments including a mixture of different materials most of them thermo labile. In consequence these instruments become more and more expensive which increases the demand for reuse. By now the manufacturer are obligated to specify the reprocessing procedure which may be a restriction in the development of new products. Therefore, there is a real need for new reprocessing procedures. Especially plasma processes are commonly discussed as a promising alternative although only few plasma based techniques are up to now commercial available.

Three examples for plasma based reprocessing are discussed in detail:

1. Classical gas sterilization device: Based on a commercial steam sterilizers of low temperature and formaldehyde (LTSF). The formaldehyde unit is replaced by plasma gas generator based on the PLeXC® technology developed at INP. This plasma based decontamination technique was tested on long tubes similar to biopsy channels of endoscopes.
2. Atmospheric pressure plasma coating with nanoparticles in order to generate antimicrobial acting surfaces. With a special treatment unit based on the principle of a dielectric barrier discharge the inner surfaces of tubes are coated with nanoparticles.
3. "Plasmoscope": using special plastic tubes, which include a helical electrode structure it is possible to manufacture endoscopes which allow plasma operation in their biopsy channel. This plasma can either used for decontamination, a reprocessing or under modified operation condition also for therapeutically applications. To simulate the complete reprocessing procedure the "plasmoscope" can be integrated in a reprocessing demonstrator allowing the combination of cleaning and decontamination steps.

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plasma decontamination