PIN-TO-HOLE SPARK DISCHARGE (PHD) PLASMA EXPERIMENTAL CHARACTERIZATION AND MODELING

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Recently, cold pin-to-hole spark discharge (PHD) plasma was reported to be successfully applied for the treatment of a human patient with complicated ulcerous eyelid wounds [1]. Such treatment was essentially salvatory for patient's life: PHD plasma was shown to have "healing" and bactericidal effects, while other conventional medical treatments did not have an effect. In order to understand which components of spark plasma (and associated mechanisms) caused the observed biological effects, the discharge characterization is required. This will also allow optimization of the discharge and possibly finding new medical applications.

Microsecond PHD spark discharge development was investigated both experimentally and numerically. Formation of hot jet from the discharge gap has been observed and characterized. This jet is an effective mechanism of active species production in the discharge zone and they transport to the treated surface. Numerical model includes discharge and gasdynamic parts. Formation of main species was calculated and efficiency of the pin-hole discharge cell configuration for biomedical applications was analyzed.

1. V. Gostev and D. Dobrynin, ''Medical Microplasmatron'', in: 3rd International Workshop on Microplasmas (IWM-2006), 2006, Greifswald, Germany.