The Microhollow Cathode Discharge as ion source for mass spectrometr

Kerstin Kunze, Manuela Miclea, Joachim Franzke, Kay Niemax

Institute of Spectrochemistry and Applied Spectroscopy, Dortmund, German

Microhollow Cathode Discharges (MHCD) are atmospheric pressure, non-equilibrium discharges and well studied for the generation of excimer radiation. The investigated discharge consists of two platinum electrodes with a hole diameter of 100 µ separated by a 200 µm thick Al$_2$O$_3$ insulator. Diode laser atomic absorption spectroscopy reveals a gas temperature of 2000 K and 1000 K and electron density o 6x10$^{15}/cm^3$ and 2x10$^{14}/cm^3$ for Ar and He, respectively [1]. The ionization degree of 10^{-3} to 10$^-5$ at atmospheric pressure makes the plasma suitable as a mass selective detector for analytical purposes. Hereby the discharge expands from atmospheric pressure on anode side to a low-pressure regime on cathode side. The MHCD does not only act as an ion source, but the small aperture serves also as sampler for the quadrupole mass spectrometer. Halogenated hydrocarbons in gas mixtures as well as liquid samples, preseparated by a gas chromatograph, could be detected by the halogen mass in the low ppb range.

[1] M. Miclea et al., Proc. XVI-th ESCAMPIG Conf., 14-18 July, Grenoble - France (2002)