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MIP source for analytical applications: experimental and simulation study MARGARITA BAEVA, ANDRE BÖSEL, JÖRG EHLBECK, DETLEF LOFFHAGEN, INP Greifswald e.V., Germany — Experimental and simulation studies of a waveguide-based microwave induced plasma (MIP) source which operating at 2.45 GHz in atmospheric pressure helium gas are presented. The plasma source is aimed at optical emission spectroscopy and has a small discharge volume, low gas flow and microwave power at high power density to obtain high excitation temperatures. The emitted spectra have been observed for various gas flow and microwave power values. the rotation and excitation temperatures derived from the spectra are found to be between 2000 K and 4000 K. The measurements are completed by a collisional radiative (CR) model delivering the electron density and temperature, amplitude of the electric microwave field, and population of the excited atomic states for a given absorbed power and gas temperature. A two-dimensional model of the plasma source based on Maxwell's equations is further applied to obtain the distribution of the electric field and the absorbed microwave power density . The basic relations are solved for plasma density of $4.4 \times 10^{19} m^{-3}$ resulting from the CR model. With a total power of 40 W, an average electric field of 3.8×10^5V/m is reached.

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