

Laser Absorption Spectroscopy of Electric Discharge Plasma with Copper Vapour Admixtures

Friday, November 8, 2024 3:45 PM (15 minutes)

The spatial distribution of number density of copper atoms in the plasma of electric arc discharge with copper vapour admixtures is determined by method of linear laser absorption spectroscopy. For this purpose, the discharge gap is illuminated by radiation of laser on the copper vapours. The absorption coefficient and, therefore, number density of absorbing species is determined from the experimentally obtained optical thickness of plasma.

The investigation of spatial distribution of optical thickness of plasma with copper vapour admixtures is carried out by the experimental setup using the laser on copper vapours "Kriostat 1" as a radiation source. The generation spectrum of this laser type contains two Cu I spectral lines: 510.5 and 578.2 nm. The diffraction grating is additionally used in optical scheme to separate one of these spectral lines.

The use of a two-dimensional CMOS matrix as a registration device provides possibilities to study the spatial distribution of number density of copper atoms in the plasma of electric discharges with copper vapour admixtures. The discharge gap was probed by laser radiation beam on the wavelength, separated by the diffraction grating. The registration of the beam which passed through the plasma is performed in the experiments by the matrix of 6000x4000 pixels. The recorded digital image is treated by the specially developed software. Thus, the proposed technique principally enables to obtain simultaneously the 2D distribution of plasma optical thickness.

ACKNOWLEDGMENT

This work was supported by the National Research Foundation of Ukraine (Grant № 167/0169)

Type of presence

Presence at Taras Shevchenko National University

Primary author: Ms SYCH, Daryna (Faculty of Radiophysics, Electronics and Computer Systems of Taras Shevchenko National University of Kyiv)

Co-authors: MURMANTSEV, Aleksandr (Faculty of Radiophysics, Electronics and Computer Systems of Taras Shevchenko National University of Kyiv); Dr IVANISIK, Anatoliy (Faculty of Radiophysics, Electronics and Computer Systems of Taras Shevchenko National University of Kyiv); Prof. VEKLICH, Anatoly (Faculty of Radiophysics, Electronics and Computer Systems of Taras Shevchenko National University of Kyiv)

Presenter: Ms SYCH, Daryna (Faculty of Radiophysics, Electronics and Computer Systems of Taras Shevchenko National University of Kyiv)

Session Classification: Laser-Plasma Interactions and Spectroscopy