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September 15-20, 2019, Tomsk, Russia



Leningrad Laser
Systems

50 YEARS

OF THE INSTITUTE
OF ATMOSPHERIC
OPTICS

AMPL 2019

PULSED LASERS AND LASER APPLICATIONS

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ABSTRACTS

AMPL-2019

PULSED LASERS AND LASER APPLICATIONS

September 15–20, 2019

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Institute of Semiconductor Physics SB RAS, Novosibirsk, Russia

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ORGANIZING COMMITTEE ADDRESS

Institute of Atmospheric Optics SB RAS
 1, Acad. Zuev Sq., Tomsk, 634055, Russia
 Phone: +7 3822 49-03-93,
 +7 3822 49-16-85
 Fax: +7 3822 49-20-86
 E-mail: ampl@asd.iao.ru
 Web site: <http://symp.iao.ru>



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E-6

OPTICAL ION BEAM PROFILE DETERMINATION USING EMISSION FROM NEUTRAL AND IONIC ARGON, NEON, AND NITROGEN TRANSITIONS

R. Hampf, A. Ulrich¹ and J. Wieser²

¹Technical University of Munich, 1 James Franck Str., 85748 Garching, Germany;

²Excitech GmbH, 33 Brantereï Str., D-26419, Schortens, Germany

The possibility to use optical emission (300–800 nm wavelength range) of ion beam excited gas targets for beam profile measurements has been studied with respect to light intensity, time structure, and spatial resolution, over a wide pressure range. Specific emission lines were selected, using optical bandpass filters. Ionic lines exhibit a quite constant beam profile, generally independent of the target gas pressure. Emission profiles, derived from neutral lines, essentially coincide with ionic line profiles only at very high and very low pressures, with a strong blow-up of the apparent beam profile at intermediate pressures in the 10^{-2} –10 mbar range, indicating significant excitation by secondary electrons. Causation of different beam profiles and consequences for real beam profile determination will be discussed.

E-7

INVESTIGATION OF THE RADIATION INTENSITY OF THE DISCHARGE COMPONENTS DEPENDING ON THE CURRENT

L.V. Mesarosh¹, M.P. Churchman² and A.K. Shuaibov²

¹Transcarpathian Hungarian Institute, 6 Kosuth Str., 90202 Berehovo, Ukraine,
liviamesarosh@gmail.com;

²Uzhhorod National University, 54 Voloshyn Str., 88000 Uzhhorod, Ukraine,
Shuaibov@univ.uzhgorod.ua

The results of spectroscopic studies of a glow discharged plasma at atmospheric pressure in air with an electrode based on distilled water are presented. The emission intensity of the various components of the plasma depends on the discharge current but in different ways. Thus, increase of discharge current from 10 to 32 mA leads to increase in the intensity of the OH bands and to a decrease in the intensity of the N₂ bands. By analyzing the change in the intensity of the OH bands with increase of current it can be seen that the intensity increases most most quickly after a value of 24 mA. A similar type of behavior is observed for the emission of the hydrogen atoms. There is also a substantial increase in the intensity of the NO emission after 24 mA, while at lower currents the intensity is almost constant. Thus, the emission of N₂ dominates at small discharge currents. The intensity of the emission of N₂ molecules decreases with the increase of the discharge current to 19 mA, after which it changes little. The dependence of the emission intensity of the copper ions on the discharge current is irregular in nature, and minima are observed at current of 12 and 22 mA.

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