Abstract Submitted
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Measurement of the plasma temperature in HID-lamps by emission- and absorption-spectroscopy of Dy spectral lines[1] M. WESTERMEIER, C. RUHRMANN, A. BERGNER, P. AWAKOWICZ, J. MENTEL, Institute for Plasma Technology, Ruhr-University Bochum, Germany — To investigate physical effects like the emitter-effect in HID-lamps, it is essential to know the plasma temperature T_{Pl} inside the burning arc plasma. Up to now T_{Pl} was determined by measuring the absolute intensity of Hg spectral lines while assuming a saturated and constant Hg pressure inside the HID-lamp. Within this work, a special broadband absorption spectroscopy measurement by means of a powerful UHP-lightsource is combined with an absolutely calibrated measurement of the emission lines of Dy. Thus, the population density of the ground-state and of an excited energy state of the Dy atoms is determined. With the assumption of a Boltzman energy distribution, the Dy temperature can be calculated from this measurement which is equal to the plasma temperature T_{Pl} in the LTE plasma of an HID-lamp. As this T_{Pl} measurement is independent of the Hg-content it might be important for the investigation of Hg-free HID-lamps in the future. Results of the plasma temperature measurements in different YAG HID-lamps for high and low operating frequencies will be presented and compared to the results of former Hg-dependent measurements.

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