

Abstract Submitted
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Investigation of the emitter effect in high intensity discharge lamps¹ C. RUHRMANN, M. WESTERMEIER, A. BERGNER, J. MENTEL, P. AWAKOWICZ, Electrical Engineering and Plasma Technology (AEPT), Ruhr-University Bochum, Germany — The improvement of lifetime is a particular interest of actual research into HID lamps. It can be achieved by a reduction of the temperature of the tungsten lamp electrodes being accomplished by the so called “gas phase emitter effect.” It is generated on the electrode surface by a monolayer of electropositive atoms of certain emitter elements (e.g. Ce or Dy) which are added to the lamp filling. This monolayer with dipole character reduces the effective work function and therefore the potential barrier for electrons leaving or entering the electrode. A quantification of the emitter effect is performed in front of the electrode by electrode tip temperature measurements as well as density measurements by means of absolutely calibrated optical emission and absorption spectroscopy. Spatial and phase resolved electrode tip temperature and density measurements of the emitter material in special research HID lamps will be presented for low and high frequencies.

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