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Investigation of anodes for high intensity discharge lamps OLIVER LANGENSCHEIDT, LARS DABRINGHAUSEN, STEFAN LICHTENBERG, MARCO REDWITZ, JUERGEN MENTEL, PETER AWAKOWICZ, Ruhr-University of Bochum — To optimize the electrodes of high intensity discharge (HID) lamps a detailed physical understanding of the interaction between the arc column and the cathode and anode has to be achieved. In the Bochumer model lamp the anodic behaviour of electrodes for high intensity discharge lamps was characterized by pyrometric, electric and spectroscopic measurements. The lamp was operated with currents between 0.5A to 10A in pure noble gases at pressures up to 1MPa and pure or doped tungsten electrodes of different sizes. The temperature and power losses of the anode were determined by pyrometric measurements, the anode fall by Langmiur-probe measurements. Spatially resolved spectroscopic measurements yield the electron temperature and density in front of the anode. It is found that the plasma in front of the anode consist of a contraction zone with enhanced power input and an anodic boundary layer which converts thermal power into electrical power. The temperature of the anode shows a stronger current dependency than the cathodic tip temperature. In AC operation it is possible to pre-heat the electrode during the anodic phase and therefore to influence the subsequent type of cathodic arc attachment.

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