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Phase resolved investigation of the power balance of HID lamp electrodes from low to RF frequency operation JENS REINELT, MICHAEL WESTERMEIER, JUERGEN MENTEL, PETER AWAKOWICZ, Ruhr-University of Bochum, Germany — For HID lamps the electrode temperature is a very important parameter since it has a strong influence on the whole discharge. Also the power balance of the lamp is strongly depending on the electrode temperature. For the efficiency of the lamp it is very important to minimize the part of the input power P_{in} which is not transformed into visible light. This part mainly consists of the power input into the electrode plasma sheaths P_{sheath} which is in part dissipated by thermal radiation of the electrodes and in part by heat conduction to the lamp bulb. For dc operation an extensive investigation of these parameters can be found in literature. For ac operation these parameters change since now the heat capacity and the change of the polarity of the electrodes have to be considered. Shown are phase resolved measurements and calculations for various frequencies at the Bochum model lamp of the electrode temperature, the input power, the power loss of the electrodes and the electrode sheath voltage (ESV). Furthermore calculations of the cathode and anode fall voltage U_c and U_a are presented.

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