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Investigation of Ce-emitters in high intensity discharge lamps[1]
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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 lamp electrodes being accomplished by the so called "emitter effect." It is generated by an atomic monolayer of certain emitter elements (e.g. Ce, Dy) on the tungsten electrode surface by which the work function is reduced. By means of a special optical absorption spectroscopy setup - presented in an accompanying contribution - the absorption coefficient of resonance lines is measured and the ground state atom density of the respective emitter material is determined within the plasma. Spatial and phase resolved measurements of Ce-densities and associated electrode temperatures in special research HID lamps will be presented for low and high frequencies. An emitter effect is observed not only in the cathodic but also in the anodic phase. At high frequencies the effect of the emitter material on the electrode temperature converges in both phases due to the inertia of the Ce-atoms and ions.

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