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Flickering of thoriated and lanthanized tungsten cathodes THOMAS HOEBING, PATRICK HERMANNS, ANDRE BERGNER, CORNELIA RUHRMANN, Ruhr-University Bochum, HANNES TRAXLER, INGMAR WE-SEMANN, Plansee SE, JUERGEN MENTEL, PETER AWAKOWICZ, Ruhr-University Bochum — Tungsten cathodes in HID-lamps are commonly doped with rare earth oxides to reduce the work function Φ . A popular dopant ThO₂ decreases Φ from 4.55 eV to 3.0 eV and, therewith, reduces the cathode temperature. La₂O₃cathodes seem to represent an alternative, since the reduction of Φ is comparable to that of thoriated cathodes. But a temporally unstable arc attachment can be observed at cathodes doped with La_2O_3 . At thorized cathodes, this flickering can also be detected, but less pronounced. It is attributed to a temporal increase of Φ , induced by a transient shortage of La at the cathode tip. The arc attachment moves from the tip to colder areas of the cathode, where a high amount of La is present. Reasons for a temporal increase of Φ can be attributed to an insufficient transport of oxides from the interior of the cathode and an insufficient return of vaporized La by an ion current from the arc plasma to the cathode. Enrichments of La / Th compounds are formed on the cathode surface providing emitter material in case of a shortage at the tip. Cathode coverage and diffusion in the interior of the electrode, ThO₂- and La₂O₃-electrodes behave differently. Differences and their influence on the stability of the arc will be presented.

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