Abstract Submitted
for the GEC14 Meeting of
The American Physical Society

Performance and aging effects of automotive HID-Lamps when replacing thorium in the electrodes ALEXANDER ALEXEJEV, ANDRE BERGNER, THOMAS HOEBING, CORNELIA RUHRMANN, Ruhr University Bochum, PETER FLESCH, OSRAM AG, Berlin, JUERGEN MENTEL, PETER AWAKOWICZ, Ruhr University Bochum, RUHR UNIVERSITY - OSRAM AG COLLABORATION — Tungsten electrodes in automotive HID-Lamps up to now are mostly doped with thoriumdioxide (ThO2). The doping decreases the work function Φ of tungsten from 4.55 eV to 3.0 eV, thus leading to a reduced electrode temperature, resulting in an increased lifetime of the lamp. However, usage of thorium is no longer recommendable, due to complicated trade relationships and transportation issues. An alternative filling or doping is being searched for, which should replace thoriumoxide without affecting the lamp performance. The fillings/dopants are usually rare earth iodides/oxides respectively. Rare earths have similar physical properties as thorium in terms of electronegativity and adsorption energy. Theoretically, several of them can replace thorium. The resulting lamp performance is, however, greatly affected even by minor changes in the filling/doping. The effect of each new component has therefore to be studied by an investigation of the electrode behaviour during lamp operation. The authors present different lamp configurations and their performances, being shown by optical observation and electrode temperature measurements, as well as the aging effects of the investigated lamps.

Alexander Alexejev
Ruhr University Bochum

Date submitted: 13 Jun 2014 Electronic form version 1.4