Abstract Submitted
for the GEC16 Meeting of
The American Physical Society

Developing a diagnostic tool for measuring maximum effective temperature within high pressure electrodeless discharges. MICHAEL WHITING, BARRY PRESTON, STUART MUCKLEJOHN, MONICA SANTOS, GRAEME LISTER, Ceravision Limited — Here we present an investigation into the feasibility of creating a diagnostic tool for obtaining maximum arc temperature measurements within a high pressure electrodeless discharge; utilizing integrating sphere measurements of optically thin lines emitted from mercury atoms within commercially available high pressure mercury lamp arc tubes. The optically thin lines chosen were 577 nm and 1014 nm from a 250 W high pressure mercury lamp operated at various powers. The effective temperature could be calculated by considering the relative intensities of the two optically thin lines and comparison with the theoretical ratio of the temperature dependent power emitted from the lines derived from the atomic spectral data provided by NIST. The calculations gave effective arc temperatures of 5755, 5804 and 5820 K at 200, 225, 250 W respectively. This method was subsequently used as a basis for determining maximum effective arc temperature within microwave-driven electrodeless discharge capsules, with varying mercury content of 6.07, 9.4 and 12.95 mg within $1\times\ 10{-}^{6}\ m^{3}$ giving maximum effective temperatures of 5163, 4768 and 4715 K respectively at $\sim$240 W.

Michael Whiting
Ceravision Limited

Date submitted: 13 Jun 2016 Electronic form version 1.4