

Abstract Submitted  
for the GEC13 Meeting of  
The American Physical Society

**Diagnostics and Monitoring of a Plasma Beam Source based on Optical Emission Spectroscopy**<sup>1</sup> JENS HARHAUSEN, RÜDIGER FOEST, DETLEF LOFFHAGEN, ANDREAS OHL, JAN SCHÄFER, Leibniz Institute for Plasma Science and Technology — Plasma ion assisted deposition (PIAD) is employed for the production of high performance optical coatings. Here, the assist-source is a hot cathode DC discharge (Advanced Plasma Source APS) which generates an ion beam (ion energy  $E_i \sim 50\text{-}150\text{ eV}$ ) based on an expansion process at a chamber pressure of  $p \sim 20\text{ mPa}$ . Efforts in plasma characterization have been made to improve the PIAD concept in terms of quality and reproducibility. In this contribution results on the electron energy distribution function (EEDF) and local emission of argon neutral and ion species in the plasma plume are presented. The interpretation of emission is supported by collisional radiative modeling. Main findings are the occurrence of a nonlocal EEDF and an inhomogeneous distribution of emission which is sensitive to the conditioning of the APS, like the cathode temperature. This detailed view allows a novel approach to monitor the plasma state in this particular deposition environment along with employing a control scheme for PIAD. First results obtained for oxide layers ( $\text{TiO}_2$ ,  $\text{Al}_2\text{O}_3$ ) are discussed.

<sup>1</sup>Funded by the German Ministry for Education and Research (BMBF, Fkz. 13N10462).

Jens Harhausen  
Leibniz Institute for Plasma Science and Technology

Date submitted: 14 Jun 2013

Electronic form version 1.4