Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

In-situ monitoring of plasma ion assisted deposition (PIAD) processes[1] JENS HARHAUSEN, RÜDIGER FOEST, DETLEF LOFFHAGEN, Leibniz Institute for Plasma Science and Technology, Felix-Hausdorff-Straße 2, 17489 Greifswald, Germany — Present photonics applications depend on accurate production techniques. Plasma based processes might be termed the backbone of multilayer optical coatings which are the key components of dielectric mirrors, filters or antireflectives. However, the sector strongly relies on process recipies based on empirical optimization of thin film properties. Limitations in quality, repeatability and yield are faced. In this contribution results of efforts on plasma characterization of a beam source employed for PIAD are presented. Data on electron and ion kinetics as well as optical emission facilitated a comprehensive understanding of underlying physics of ion beam generation and propagation in an industrial type batch coater. In order to promote the development of next generation production plants, concepts for in-situ diagnostics are investigated. Results from monitoring of optical radiance of the plasma plume near the source and electron density near the substrates are discussed. The novel concept of the multipole resonance probe is applied during deposition in order to trace variations not only in magnitude of plasma density, but also its spatial distribution. Coating materials comprise TiO_2, Ta_2O5, Al_2O_3 and SiO_2.

[1]Funded by the German Federal Ministry of Education and Research (BMBF) under grant 13N13213).

Jens Harhausen
Leibniz Institute for Plasma Science and Technology,
Felix-Hausdorff-Straße 2, 17489 Greifswald, Germany

Date submitted: 18 Jun 2015 Electronic form version 1.4