P 12: Poster: Plasma-Wand-Wechselwirkung

Time: Tuesday 16:30–19:00 Location: Poster.III

P 12.1 Tue 16:30 Poster.III

Einfluss des Neutralgasdruckes auf die Linienemission von laserinduzierten Plasmen vor Wolfram und Graphitoberflächen — •A Kubina, A Huber, B Schweer, V Philipps, M Zlobinski, N Gierse und Q Xiao — Institut für Energie- und Klimaforschung - Plasmaphysik, Forschungszentrum Jülich GmbH, Assoziation EURATOM-FZJ, Trilaterales Euregio Cluster, Jülich

Die Speicherung von Tritium in den Plasma umgebenden Gefäßwänden ist von kritischer Bedeutung für den Betrieb von ITER. Die laserinduzierte Plasmaspektroskopie (Laser Induced Breakdown Spectroscopy - LIBS) ist eine geeignete Methode zur Bestimmung der lokalen Wandzusammensetzung und der Menge des abgelagerten Wandmaterials in Fusionsanlagen. Hierbei wird mit einem Kurzzeit-Nd:YAG-Laser über Grafit- und Wolframproben ein Laser-induziertes Plasma erzeugt und die absolute Linienintensität der freigesetzten Schichtmaterialien untersucht. Die enthaltenen Informationen lassen Rückschlüsse auf enthaltene Elemente und deren vorhandene Mengen zu. Da sowohl die Eindringtiefe des Lasers in die Probe, wie auch die Parameter des erzeugten Plasmas stark vom Druck und dem umgebenden Neutralgas abhängig sind, werden diese Parameter zuerst in einer autarken Vakuumkammer unter Laborbedingungen bestimmt. Mit einem hochauflösenden Spektrometer wird das Spektrum über einen Bereich von 350nm zeitgleich gemessen. Darüber hinaus wird das Plasmalicht mit einer CCD Kamera und schnellen Photodioden räumlich und zeitlich aufgelöst, um den Einfluss des Gasdruckes auf die Ausdehnung und auf die Lebenszeit des Plasmas zu untersuchen.

P 12.2 Tue 16:30 Poster.III

Energy balance at the substrate during magnetron sputter deposition of ZnO — •Sven Bornholdt[1], Naho Itagaki[2], Kazunari Kuwahara[2], Harm Wulff[3], Masaharu Shiratani[2], and Holger Kersten[1] — [1]Institute of Experimental and Applied Physics, Christian-Albrechts-University of Kiel, D-24098 Kiel, Germany — [2]Institute of Information Science and Electrical Engineering, Kyushu University, Fukuoka 819-0395, Japan — [3]Institute of Physics, University Greifswald, D-17487 Greifswald, Germany

The improvement of the crystalline structure of ZnO thin films deposited by PVD processes is very important for industrial manufacturing of solar cells. The description of the particle and energy fluxes and their effect on the energy balance at the substrate surface and for the resulting film properties is of essential interest. Calorimetric measurements at the substrate position were carried out in a rf-triode magnetron sputter deposition system with ceramic ZnO targets using different gas mixtures (Ar/N_2 and Ar/H_2). By variation of the probe bias the different contributions originating from the kinetic energy of charge carriers, the recombination of charge carriers at the surface as well as the contributions from impact of neutral sputtered particles and subsequent film growth are determined. Radial scans in the substrate plane were recorded for inhomogeneities in the total energy influx. Film properties like crystalline structure, growth rate and grain size were investigated using XRD and XRR. Especially the growth rate has been found to be sensitively dependent on the substrate temperature.

P 12.3 Tue 16:30 Poster.III

Formation of ammonia during nitrogen seeded discharges at ASDEX Upgrade — •Daniel Neuwirth, Volker Rohde, Thomas Schwarz-Selinger, and ASDEX Upgrade Team — Max-Planck-Institut für Plasmaphysik, EURATOM Association, Garching, Germany

The seeding of impurities will be mandatory for ITER to protect the tungsten divertor from local heat loads. Presently the best candidate seems to be nitrogen, but reactions with hydrogen are possible. The formation of ammonia is a serious issue for gas plants, cryo pumps and plasma control. Therefore the residual gases of discharges with and without nitrogen seeding at ASDEX Upgrade have been investigated by mass spectrometry. For the deconvolution of the measured spectra a method was developed that takes into account different protium concentrations in different compounds. The applied absolute calibration of the mass spectrometers allowed a quantitative analysis. A significant formation of ammonia was observed during nitrogen seeded H-mode discharges. Up to 8% of the seeded nitrogen atoms have formed ammonia molecules. Ammonia was present in the residual gas of the nitrogen seeded discharge itself, but also in the residual gases of subsequent non nitrogen seeded discharges. Futhermore a reduced partial pressure of methane during nitrogen seeded discharges was observed. Undeuterated ammonia was injected into the plasma vessel of ASDEX Upgrade without plasma operation. A significant part of the ammonia was retained in the vessel. The simultaneous observation of partly deuterated ammonia indicates an interaction between tungsten wall and ammonia.