For poster presentation

Design and characterization of a synchronous co-axial double magnetron sputtering system

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High power impulse magnetron sputtering (HiPIMS) is a novel pulsed power technique. In HiPIMS, high power (hundreds of kW/cm^2) pulses are applied to the target for a short duration (~100 μs) with a low duty factor. By keeping the duty cycle at a few percent the average power to the cathode is kept low enough for a conventional cooling to suffice. The high power in the pulse causes the plasma in front of the target to reach very high densities (10^{19} m^{-3}), thus allowing efficient ionization of the sputtered species (in some cases up to 90%), which results in densification of the grown films. Recently a large side-transport of the sputtered material has been discovered in the HiPIMS regime, meaning that the sputtered material is transported radially outwards parallel to the cathode surface. In this research, we use this effect and study the side-ways deposition of thin films. We designed a new magnetron sputtering system, consisting of two opposing magnetrons with similar polarity. This double cathode system provides an open field magnetic field configuration which was utilized for the side-ways deposition of Ti films. Optical emission spectroscopy measurements showed a very high ionized fraction of the sputtered material (~ 300 %), while the electron density of the order of 10^{18} m^{-3} was obtained by Langmuir probe measurements. The conclusion is that the system works well for side-ways deposition and it can be useful for coating the interior of cylindrically shaped objects.