

Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

Two-Dimensional Particle-in-Cell Simulation of Cylindrical Magnetron Sputters for the Improvement of Target Utilization¹ MIN YOUNG HUR, HYOWON BAE, IN CHEOL SONG, HO-JUN LEE, HAE JUNE LEE, Pusan National University, PNU PLASMA RESEARCH CENTER TEAM — Magnetron sputtering has been commonly used for the deposition of a wide range of industrial thin film coating. This method has almost no restrictions in the target materials and the magnetic field enables lower pressures operation. Conventional flat type sputters generate ion-bombardment sputtering in only a localized region of target where electric fields and magnetic fields are perpendicular to each other. Therefore, the utilization efficiency of the target material is about 20~30%. To overcome this drawback, a rotating cylindrical target is devised to make uniform sputtering on the target. In this paper, the difference of the physical effects of ions on the targets between the flat-type and the cylindrical-type sputters is investigated using a two-dimensional particle-in-cell (PIC) simulation with Monte Carlo collisions. Especially for the calculation of cylindrical field solver with a finite difference method, an image charge method is introduced instead of solving the Poisson equation directly. Simulation Diagnostics include the plasma density, the distributions of energy and angle of incident ions on the target, and the deposition profiles on the substrate calculated by a ray-trace particle deposition model. The analysis for the rotating speed and the magnet structure is

¹This work was supported by “Development Program of Nano Process Equipments” of Korea Ministry of Knowledge Economy.

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Date submitted: 18 Jun 2012

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