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Outer Ring-Shaped Magnetized Plasma by RF and HiPIMS Source HOSSAIN MD. AMZAD, YASUNORI OHTSU, Graduate School of Science and Engineering, Saga University — We have proposed a magnetized outer ring-shaped plasma sputtering source with a concentrically monopole arrangement of magnets with each gap of $R = 5$ mm for specific target area utilization by radio frequency (RF) and high power impulse magnetron sputtering (HiPIMS). The three setups are investigated such as with a center magnet with case (a): magnet arrangement with three circles, case (b): magnet arrangement with two circles, and case (c): magnet arrangement with one circle from the point of view of specific outer area target utilization. In the experiments, Ar gas of 12.0 [Pa], RF power of 50100 [W] at 13.56 [MHz] for RF discharge and Ar gas of 12.0 [Pa], target voltage of 6001000 [V] at 2.5 [kHz] and pulse width of 20 μs for HiPIMS source are used to produce the plasma. 2D magnetic field map shows that the magnetic flux density in component transverse to the target surface has a peak density the exterior circle of magnet arrangement for all setups. Ring-shaped plasma in the specific target outer area is observed for both RF and HiPIMS discharge where the transverse component of magnetic flux is sufficiently high and its diameter depends on a number of magnets on the circles. The experimental results are summarized based on the radial profile of ion saturation current, plasma density and the typical discharges between RF and HiPIMS source.

Hossain Md. Amzad
Graduate School of Science and Engineering, Saga University

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