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Spatially resolved characterization of momentum transfer during sputter processes

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In this work, the momentum carried by reflected and sputtered particles in a sputter plume is characterized. A sputter target is mounted in front of an ion beam on a rotatable platform. For each angle on incidence, a different sputter plume is generated. These plumes are characterized using interferometric force probes [1]. In contrast to conventional diagnostics, a force probe does not rely on charged particles but measures also neutrals and supports a more comprehensive picture of the sputtering process. A double axis version of force probes is used to determine the momentum transfer onto the sputter target itself. A second force probe is used to circle around the target scanning through the resulting plume of sputtered target atoms and beam particles. The ejection distributions then compared with simulated data using SRIM [2]. For the experiment copper and silver targets have been used. Additionally, ion energy, gas type and gas pressure are varied.

[1] Spethmann, A., Trottenberg, T., Kersten, H., Phys. Plasmas 24(2017), 093501.

[2] J. Biersack and L. Haggmark, Nucl. Instrum. Methods 174, 257 (1980).

Keywords

ion beam

sputtering

diagnostic

force probe

SRIM