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Development of Magnet-Free Sputtering System for Dielectric Film Deposition with Surface-Wave Excited Plasma¹ TOMONORI NODA, TOSHIYA HAGIHARA, HIROTAKA TOYODA, Nagoya University — In various thin film deposition technologies such as plasma-enhanced chemical vapor deposition or vacuum evaporation, plasma sputtering is known as one of common technology because of its applicability to the deposition of high-melting-point materials on glass or polymer substrates. However, degradation of interface and/or crystalline quality due to impingement of high-energy-particles is sometimes one of issues for sputter deposited films. In our previous study, we have shown that high energy negative ions are localized not at high plasma density regions but at low plasma density regions in the case of dielectric RF sputtering. This fact suggests that the movement of the magnet (and the plasma) that is common in industrial sputtering system results in non-uniform irradiation of high energy negative ions on the depositing film surface. To solve such problem, we propose uniform sputtering of dielectric materials without using magnets, i.e., using uniform surface-wave excited plasma and RF biasing. With use of a microwave-plasma coupling antenna that can sustain plasma at low pressures less than 1 Pa, uniform sputtering of dielectric materials will be demonstrated.

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Hiroataka Toyoda
Nagoya University

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