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Time-resolved Langmuir probe diagnostics of a bipolar high power impulse magnetron sputtering discharge.

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High power impulse magnetron sputtering (HiPIMS) of a cobalt cathode in argon gas was investigated by time-resolved electrical (Langmuir) probe diagnostics and by time-integrated energy-resolved mass spectrometry. The HiPIMS discharge was operated with a bipolar pulsed power supply providing a large negative voltage with a typical pulse width of 100 μs followed by a long positive pulse with a pulse width of about 310 μs . Time-resolved Langmuir probe results yield a small negative plasma potential in the negative pulse regime and a large positive floating potential and plasma potential in the positive pulse regime. Electron density is significantly reduced during the positive pulse regime. Probe results are supported by ion energy measurements.

Keywords

magnetron sputtering

HiPIMS

bipolar pulse

time-resolved Langmuir probe

energy-resolved ion mass spectrometry