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Time-resolved plasma parameters in HiPIMS discharges with titanium target¹ MARTIN CADA, PETR ADAMEK, STEPAN KMENT, PETR VIROSTKO, ZDENEK HUBICKA, Institute of Physics of the ASCR, v.v.i. — The paper deals with time-resolved measurement of electron effective temperature, electron density, plasma and “floating” potential in High Power Impulse Magnetron Sputtering (HiPIMS) system equipped with 2” in diameter titanium target. The Langmuir probe was placed 70 mm from the target face and below the racetrack. The pressure of argon in a chamber was kept at 0.3 Pa, 2 Pa and 20 Pa. The temporal resolution of the Langmuir probe acquisition system reveals that T_e decreases during pulse ON time approximately linearly for pressure 0.3 Pa and exponentially-like for pressures 2 and 20 Pa. The steady value of T_e was approximately 0.4 eV for all the pressures. The maximal value was ~ 2.2 eV and ~ 0.6 eV for pressures 20 Pa, 2 Pa and 0.3 Pa respectively. Furthermore, the local maximum in T_e at the end of the voltage pulse is observed only for working gas pressure 2 Pa. During the pulse OFF time we observed exponential-like decay of the electron temperature for all the pressures. The plasma density demonstrates steep increase during pulse ON time. For pressures 2 Pa and 20 Pa, the plasma density reaches the maximal value at time 25 μs and 70 μs after turn off of the plasma pulse. After that we observed recombination-like plasma decay followed by ambipolar diffusion.

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