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Non-contact temperature measurement of silicon substrate in sputtering plasma using optical interferometer TAKAYUKI OHTA, KATSUHIRO HATTORI, Meijo University, AKINORI ODA, Chiba Institute of Technology, HIROYUKI KOUSAKA, Nagoya University — The substrate temperature is one of important parameters to control the plasma processing and involve the film properties or the chemistry of gas phase. High power impulse magnetron sputtering (HIPIMS) realizes a very significant fraction of the ionized species and which induced onto the substrate and heated it. It is essential to analyze the substrate temperature and the heating mechanisms. In this study, we have measured the silicon substrate temperature in HiPIMS by using the optical low-coherence interferometry. The reflected light from the front surface interferes that from back surface. The optical path length of Si wafer is obtained by the inverse Fourier transform of spectral interferogram and varies with the change in the silicon temperature. The silicon temperatures with various resistivities were measured and the change in the optical thickness increased with decreasing the resistivity owing to the carrier density of the silicon substrate. The time variation of Si substrate temperatures at various applied voltages in the HiPIMS using the titanium target was measured and the silicon temperatures increased with increasing the applied voltage.

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