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Non-contact monitoring of Si substrate temperature during plasma etching using optical low-coherence interferometry TAKAYUKI OHTA, Faculty of Systems Engineering, Wakayama University, CHISHIO KOSHIMIZU, Yamanashi Technology Development Center, Tokyo Electron AT, SHIGEKI TUCHITANI, Faculty of Systems Engineering, Wakayama University, MASUFUMI ITO, Faculty of Science and Technology, Meijo University — One of the critical parameters in many semiconductor-processing steps such as plasma etching, chemical vapor deposition, and so on, is the substrate temperature. In order to control the processing precisely, the temperature of Si substrate was monitored with non-contact by optical low coherence interferometry. The low coherence interferometry is based on Michelson interferometry, and a super-luminescent diode (SLD) was used as a low-coherence light source. We demonstrated the real-time monitoring of the temperatures of a Si wafer and a Si focus ring in a dual-frequency capacitively coupled $Ar/C_4F_8/O_2$ plasmas. The temperature of Si wafer was successfully monitored with the accuracy of 0.34 degree C in the range from room temperature to 400 degree C. The response of the the low-coherence interferometry was faster than that of a fluorescence temperature sensor, and the low-coherence interferometry enabled the monitoring of the actual temperature during plasma processing.

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