Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

Temperature measurement of substrate with a thin film using low-coherence interference TAKAYOSHI TSUTSUMI, TAKEHIRO HIRAOKA, KEIGO TAKEDA, KENJI ISHIKAWA, HIROKI KONDO, Nagoya University, TAKAYUKI OHTA, MASAFUMI ITO, Meijo University, MAKOTO SEKINE, MASARU HORI, Nagoya University — In plasma etching or plasma CVD, substrate temperature is one of the most important factors which determine the process performances. Non-contact temperature measurement technology is preferred for the fabrication of electric devices because of avoiding contamination and improving reliability. We have developed a highly precise and non-contact temperature monitor using a Fourier domain low-coherence interferometer (FD-LCI) and a super luminescent diode (SLD; center wavelength: 1330 nm, spectral width: 37.6 nm) as a low coherence light source. The temperature is derived from the changes of optical path length in substrate, which occurred by thermal expansion and refractive-index change. We achieved to estimate the Si wafer temperature during a plasma exposure. However, it is necessary to measure a substrate with thin films and/or other material substrate such as sapphire. In this report, we applied the monitor to Si wafer with carbon nanowalls and a sapphire substrate with GaN. While on heating the substrate, the optical path length increased linearly, and it turned out that non-contact measurement of substrate with a thin film could be realized for Si and sapphire substrates.

[1] T. Tsutsumi et al: ISPlasma2011, P1-002A, Nagoya, Japan, (March 2011).

Takayoshi Tsutsumi
Nagoya University

Date submitted: 18 Jun 2012 Electronic form version 1.4