

# **Laser interferometry plasma diagnostics: Recent challenges and contributions to plasma technology**

**Keiichiro Urabe**

*Air Liquide Laboratories, Tsukuba, Ibaraki, Japan*

Interferometry is a way to measure the refractive index of materials. It is one of classic methods to diagnose electron density, which is a source of chemical reactivity of plasmas, inside various plasma sources. In probing light sources, optical arrangements, and phase-shift detection systems, it is important to choose appropriate combination considering the required temporal resolution, the strong dispersion in a part of the refractive index contributed by the electron generation, and so forth.

For the ISPC-23 presentation, I would like to introduce challenges and recent development of the laser interferometry for the purpose of electron-density diagnostics mainly focusing on high-pressure plasmas. In high-pressure ambient, the contribution of gas particle to the total refractive index is significant. Therefore we need separate or avoid the effect of gas-number density variation on the detected phase-shift signal. In addition, electron collision frequency, which contributes to imaginary part of the refractive index, should be well considered in a choice of the probing laser wavelength. Through reviewing our collaborative studies solving above challenges with fusion researcher and laser manufacturer, future direction of the interferometry research and its contribution to plasma technology will be discussed.