

[초IT-01] Application of mid-infrared TDLAS to various small molecule diagnostics

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The spectroscopy over a region from 3 to 17 μm based on the tuneable diode lasers (TDLAS) is the most powerful technique for in situ studies of the diagnostics of small molecules. The increasing interest in small molecules especially containing carbon, oxygen, hydrogen, and fluorine containing ones can be fulfilled by TDLAS at 0.0001 cm^{-1} resolution, because most of these compounds are infrared active. TDLAS provides a means of determining the absolute concentrations of the ground states of stable and transient molecular species, which can be employed for the time dependent studies in sub micro second scale.

Information about gas temperature and population densities can also be derived from TDLAS measurements. Collisional energy transfer between the small molecules can be studied with TDLAS. Also, a variety of free radicals and molecular ions have been detected by TDLAS. Since plasmas with molecular feed gases are used in many applications, there are new applications in industrial field. Recently, the development of quantum cascade lasers (QCLs) offers an attractive new option for TDLAS.