Remote sensing of vapor phase chemical agent using wavelength-tunable laser

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In recent years, the need for research on natural disasters is growing urgency. The Lidar technique is a powerful means for range-resolved environmental remote sensing. The technique is especially useful in polluted areas and to implement anti-crime and anti-terrorism for a safe and secure society.

We have a tunable laser technology was originally developed by RIKEN. Raman Lidar or LAS can be used to utilizing this technology to observe the composition of the gas phase chemistry is possible.

This technique of measurement is of great help in order to observe the volcanic gases etc..

For example, the absorption spectra of major pollutant substances (H2O, DHO, NO, NO2, CH4, CO2 etc.) are generally detectable in the mid-infrared (IR) range from 3 to 5 um. Remote sensing spectroscopy using the molecule-specific absorption spectrum are DIfferential Absorption Lidar (DIAL), Laser Absorption Scattering (LAS) and etc..

On the other hand, Raman scattering is caused by incident light of wavelength-specific to molecules. Energy difference of the incident light and the light that is scattered by the Raman effect corresponds to the energy of the electron level, or level of vibration level and rotation in the material and crystal molecules. In order to have a specific vibration energy according to structure of molecules, is used to identify a substance, such as by using a laser is a monochromatic light source and crystal molecule. Remote sensing spectroscopy using the Raman effect is a Raman lidar.

It is necessary to control the wavelength of the laser arbitrarily for the both techniques. Must be considered the observation wavelength in the atmospheric absorption or the reaction of the object.

I report about the remote sensing technique that uses laser technology and its technology to control wavelength of the laser.