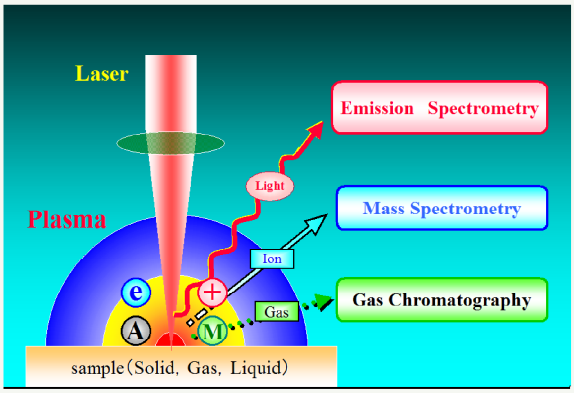
CHUBU UNIVERSITY
Electronics & Information Engineering

KUZUYA Lab.

Main Research

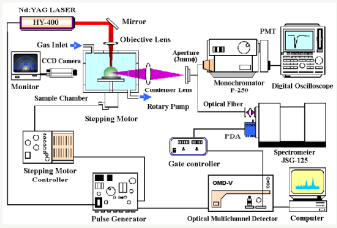
The research of Kuzuya Lab. is mainly concerned with the analytical applications of lasers. Most work concentrates on the development and improvement of Laser Microprobe Analysis system listed below, which uses a laser-induced plasma as a source for chemical analysis.

1. Laser Microprobe Analyzer (LMA)
2. Laser Ionization Mass Spectrometer (LIMS)
3. Laser Pyrolysis Gas Chromatograph (LPGC)



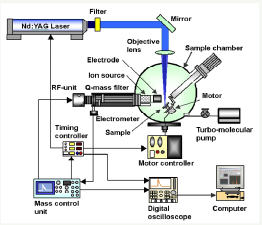
1. Laser Microprobe Analyzer (LMA)

LMA is one of several methods for direct chemical analysis of solids and has unique capabilities of analyzing microareas of any type of material, including electrically nonconductive materials, without sample preparation. LMA is one of the suitable analytical methods for the RoHS directive.



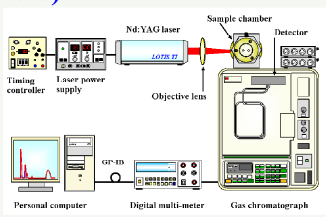
2. Laser Ionization Mass Spectrometer (LIMS)

A quadrupole-based laser ionization mass spectrometry (LIMS) system has been developed by combining a quadrupole mass filter with a laser microprobe instrument, which employs a pulse generator that synchronizes the laser pulse with the Q-mass mass scan to detect the pulsed ion signal.



3. Laser Pyrolysis Gas Chromatograph (LPGC)

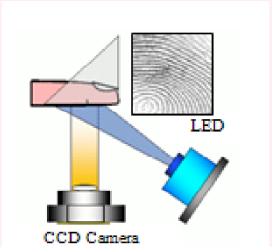
A laser pyrolysis gas chromatograph (LPGC) system has been developed which allowed for the direct analysis of solid samples. The LPGC system consists of a Q-switched Nd:YAG laser as a fragmentation source, a Gas chromatograph, a sample chamber, and a data acquisition and processing system.

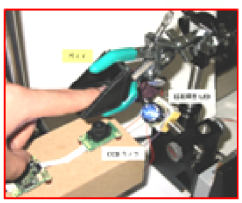


Venture Research

4. Fingerprint capturing system

Fingerprint verification is an important biometric technique for personal identification. The fingerprint capture devices currently available use the touch method. The recognition performance of this method decreases due to the finger conditions (dry, wet, and oily fingers).
In order to surmount this problem, we have developed a non-contact fingerprint capturing and recognition system.

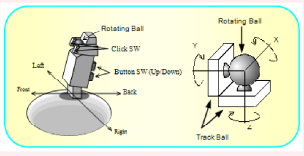


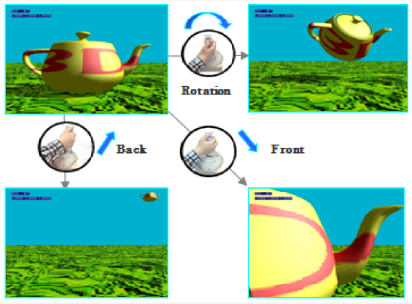


LED and CCD Camera

5. 3D Pointing Device

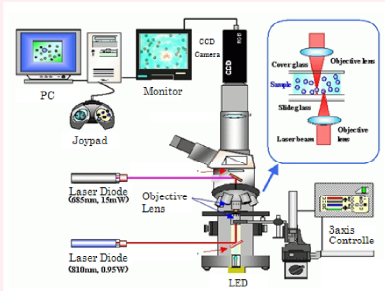
We have developed a new compact three-dimensional (3-D) input device which can handle 3-D with six degrees of freedom at the same time. The device consists of a rotating ball and a joystick, which input the rotation movement around the x, y, and z axis, and the translation movement along the x, y, and z axis, respectively.

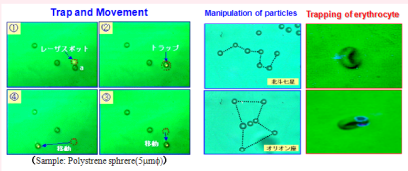




6. Laser Optical Tweezers

A laser optical tweezers (LOT) system was developed by combining a diode laser with an optical microscope equipped with a long working distance objective lens, which can manipulate microscale particles. The present LOT system produces trapping forces of tens of pN, and torque in the order of 10^{-20} Nm.





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