Graduate School of Engineering Science

Department of Systems Innovation, Division of Advanced Electronics and Optical Science

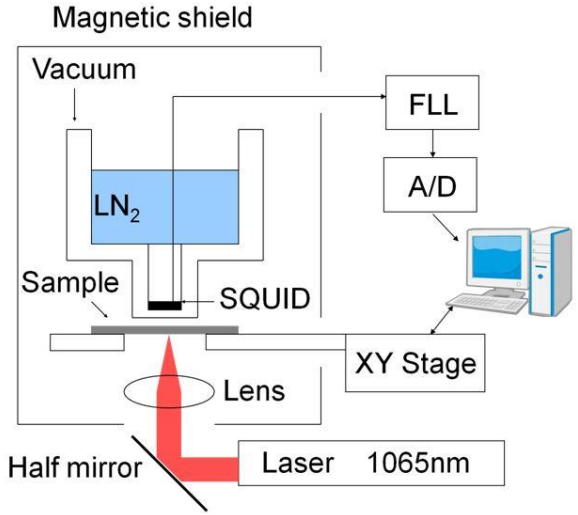
Itozaki Laboratory

http://www.sup.ee.es.osaka-u.ac.jp/

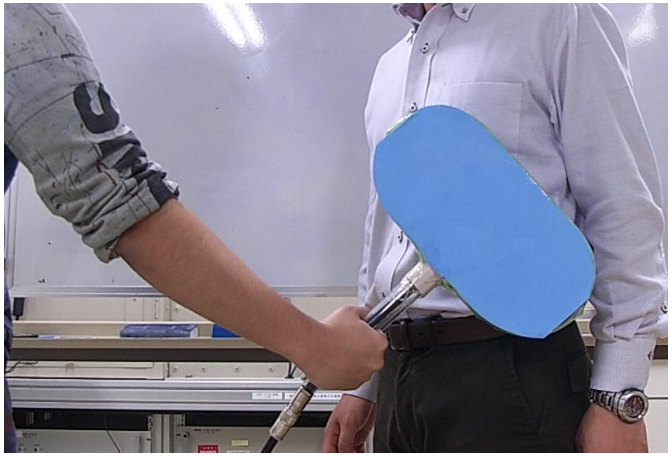
Development of sensing technology using Superconducting, Nuclear Quadruple Resonance, Near-Infrared Resonance

Staff
Professor：Hideo Itozaki [itozaki@ee.es.osaka-u.ac.jp]
Assistant Professor：Hideo Akaba [akaba@ee.es.osaka-u.ac.jp]

We have promoted the development of sensing technology using SQUID (Superconducting QUantum Interference Device), NQR (Nuclear Quadruple Resonance) and NIR (Near-Infrared Resonance). With regard to SQUID research, we have fabricated the laser SUID microscope, and evaluated the solar battery by obtaining its magnetic image. With regard to NQR research, we have developed the remote sensing technology of explosive and unauthorized drugs by irradiating and then detecting the specific wave length of the MHz band. With regard to NIR research, we have developed the inspection device for the concentration estimation of a liquid explosive in the PET bottle, which was a non-destructive analysis.



We have performed the non-contact inspection of the semiconductor with the laser SQUID microscope. The photo-excited current flows when the semiconductor is irradiated with light of greater energy than that of the band gap energy. We measured the magnetic field distribution generated by this current, and investigated the defect area of the sample.



Some individuals may attempt to bring unauthorized or explosive chemicals to an airplane by hiding them in clothes or luggage. We developed the NQR inspection equipment to detect explosive and unauthorized drugs. The NQR is a new sensing technology that relies on the specific resonant frequency which occurs to the atomic nucleus when it is irradiated.

We developed the liquid explosive detection technology using NIR with the aim of inspecting liquids, such as drinking water, before they were brought on board an airplane. We changed the density of hydrogen peroxide and measured the NIR spectrum. The NIR spectrum provided adequate detection of hydrogen peroxide water in the PET bottle.