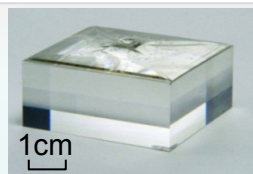


# High-speed and high-precision optical sensing technologies based on KTN optical deflector

High-speed wavelength swept light source has developed by using KTN crystal, which can freely control the direction of light without the mechanical moving part. This light source is applied to the film thickness measuring system that can measure in-situ with high precision, high sensitivity and to the position and direction detection system of underground tunnel excavators.

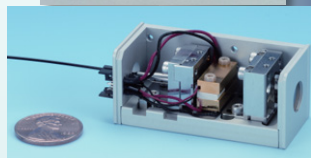
Material  
KTN crystal



High-speed wavelength  
swept light source

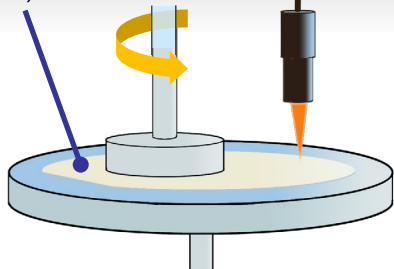


Device  
Optical deflector



## Application Scenarios

Wafer, film



High-speed and  
high-sensitive  
thickness measurement

Output/detection

Reflector

Measurement units

excavator

Tunnel position measurement system

## Features

- Wavelength swept light source : Highly stable operation for a long time at high speed and wide wavelength range using KTN crystal having a rare feature of freely deflecting light according to applied voltage
- Thickness measuring system : Using the wavelength sweep light source, the thickness of the semiconductor wafer during manufacturing and processing can be measured in situ with high accuracy and high sensitivity without being affected by vibration of the apparatus
- Position detection system : Measuring the excavator position and direction with high precision and real time at the time of underground tunnel excavation

## Application Scenarios

- Real time inspection of wafers, film thickness etc
- Detection of position (angle / distance) during tunnel excavation

## Collaboration Partner

Thickness measuring system has been developed by the combination of the KTN crystal and device technology by NTT and mounting and manufacturing technology by Hamamatsu Photonics K.K.

\* KTN: potassium tantalate-niobate ( $\text{KTa}_{1-x}\text{Nb}_x\text{O}_3$ , KTN)