

2024 光電聚落教育訓練課程

Crystal-CLSM 機台 功能介紹

成功大學 綜合大樓2樓48218室

2024/4/19 (星期五)



CRYSTAL-CLSM: CONFOCAL LASER SPECTROMICROSCOPE FOR CRYSTAL MEASUREMENT

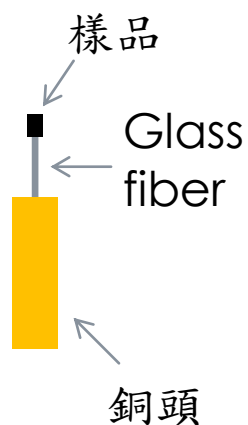
- ▶ Micro PL and Raman system with confocal detection
- ▶ Sample stage with multiple degrees of freedom to allows PL and Raman acquisitions at desired facets of a crystal

XRD structure determination of a micro crystal

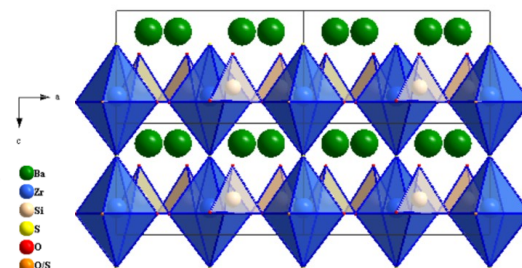
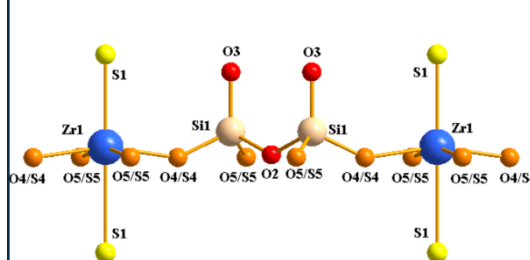
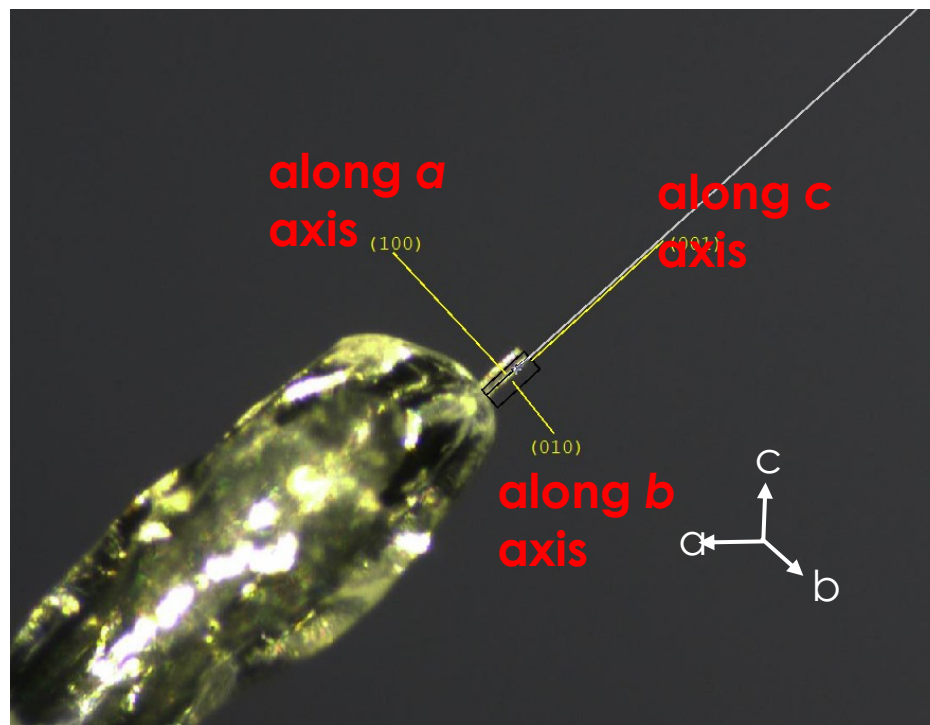


Size: 0.037 x 0.059 x 0.136mm

Mounting used for XRD



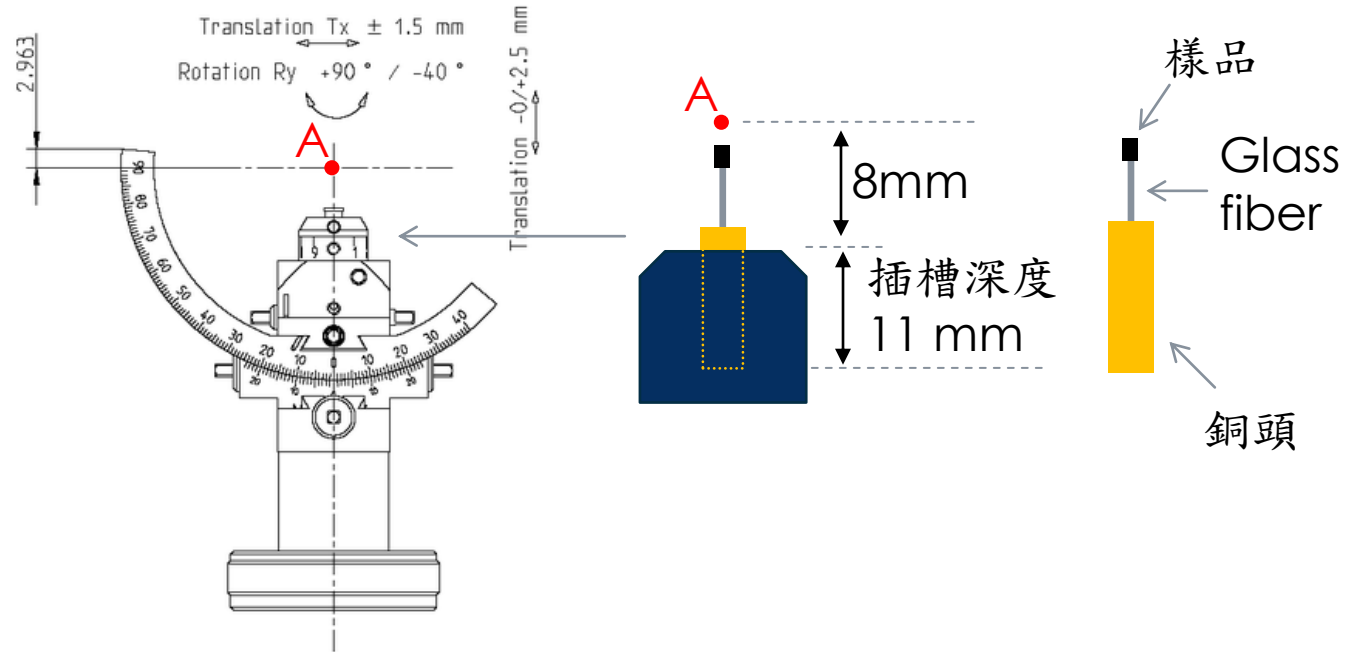
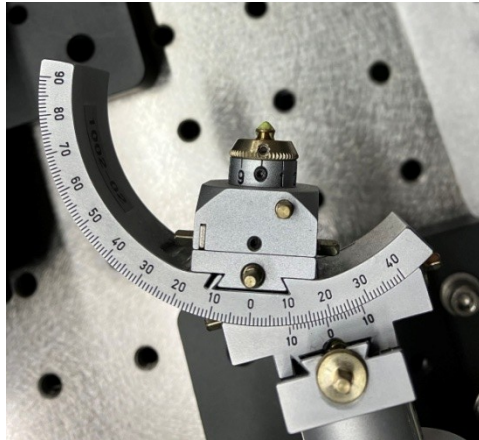
Orthorhombic P



$a=8.80\text{\AA}$, $\alpha=90.00^\circ$, $V=406\text{\AA}^3$
 $b=8.80\text{\AA}$, $\beta=90.00^\circ$, Orthorhombic P
 $c=5.25\text{\AA}$, $\gamma=90.00^\circ$

Sample grown in Prof. K.F. Hsu's lab

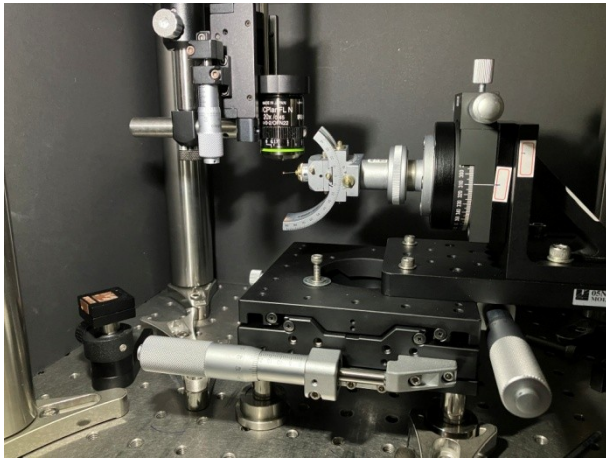
XRD SAMPLE MOUNTING ON GONIOMETER



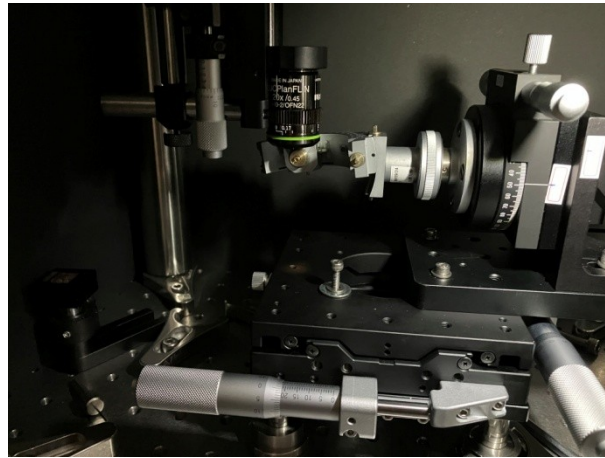
- ▶ 2 axis of precision rotation
- ▶ Rotation of crystal sample does not translate the sample
- ▶ Use similar stage for micro PL and Raman or other optical measurements

GONIOMETER POSITIONS FOR DIFFERENT CRYSTAL FACET MEASUREMENT @NTU

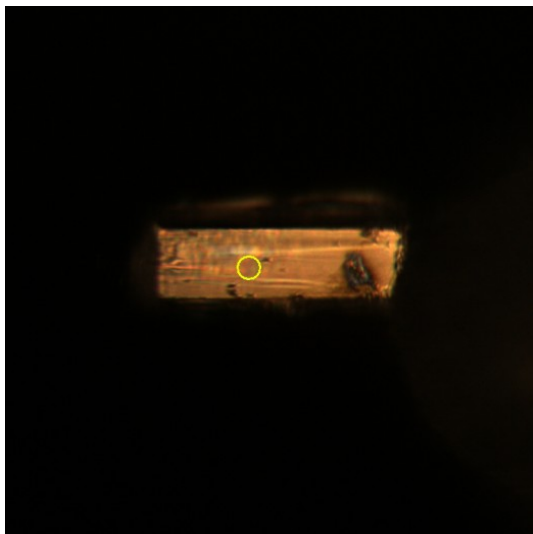
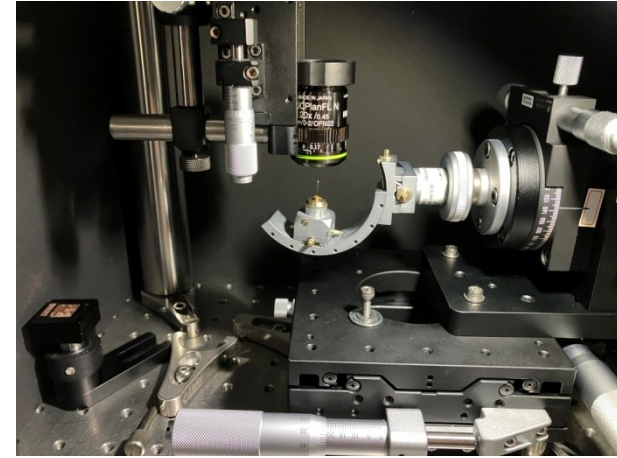
a, b face



a,b face rotate 90deg

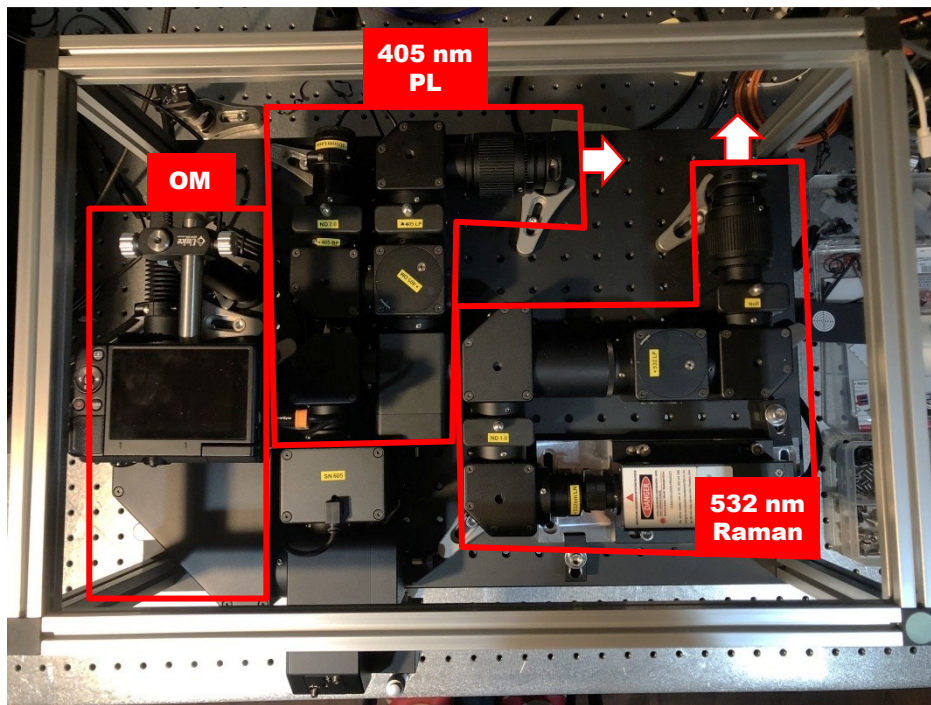


c face

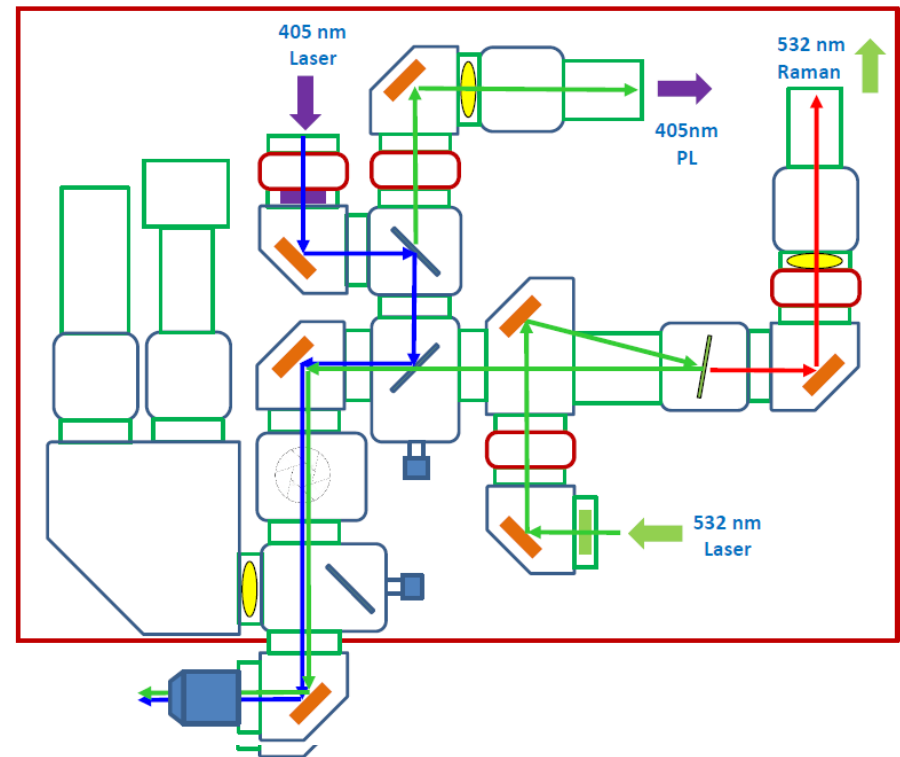


Crystal-CLSM System – Optical Layout

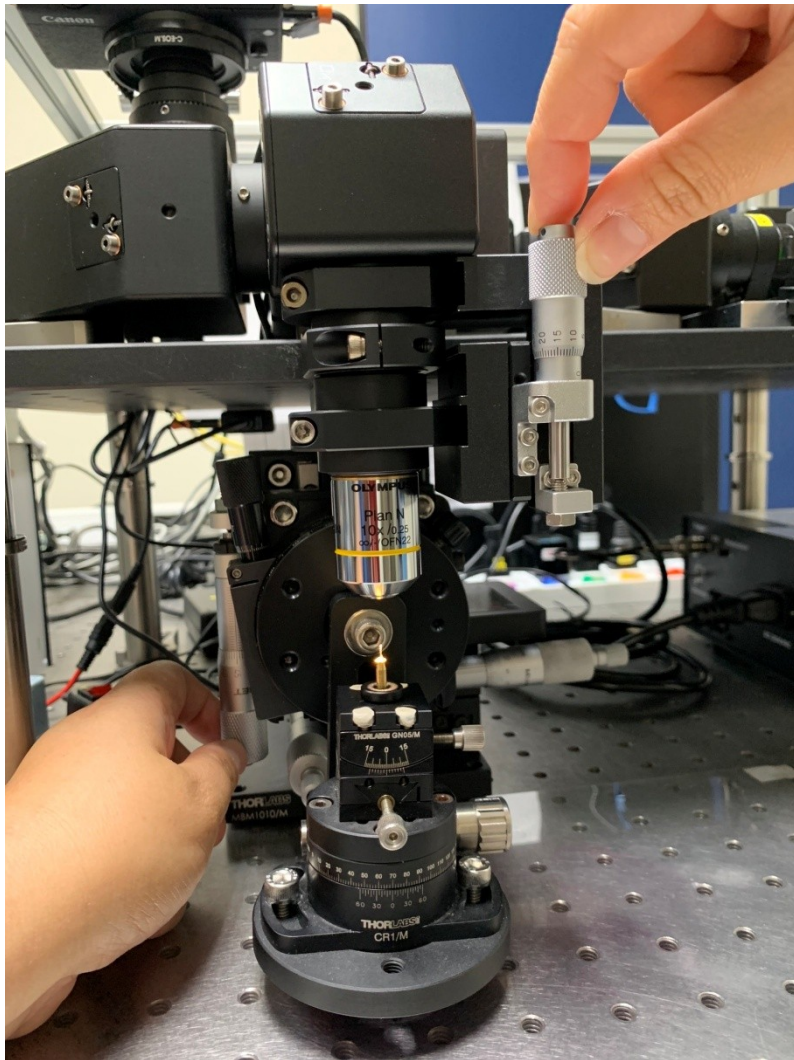
Top view



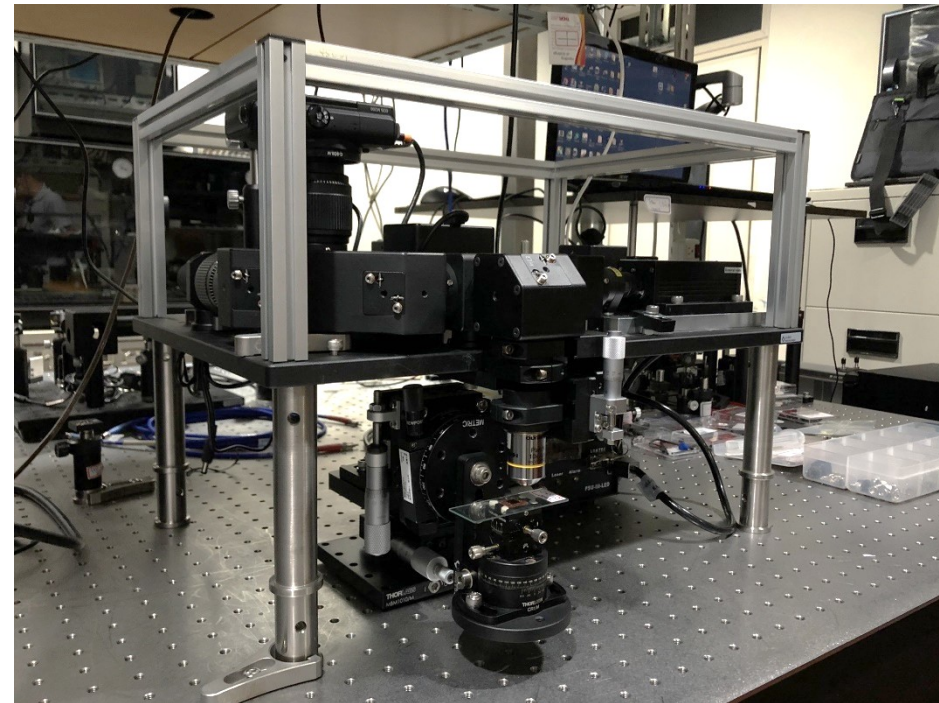
405 PL + 532 Raman



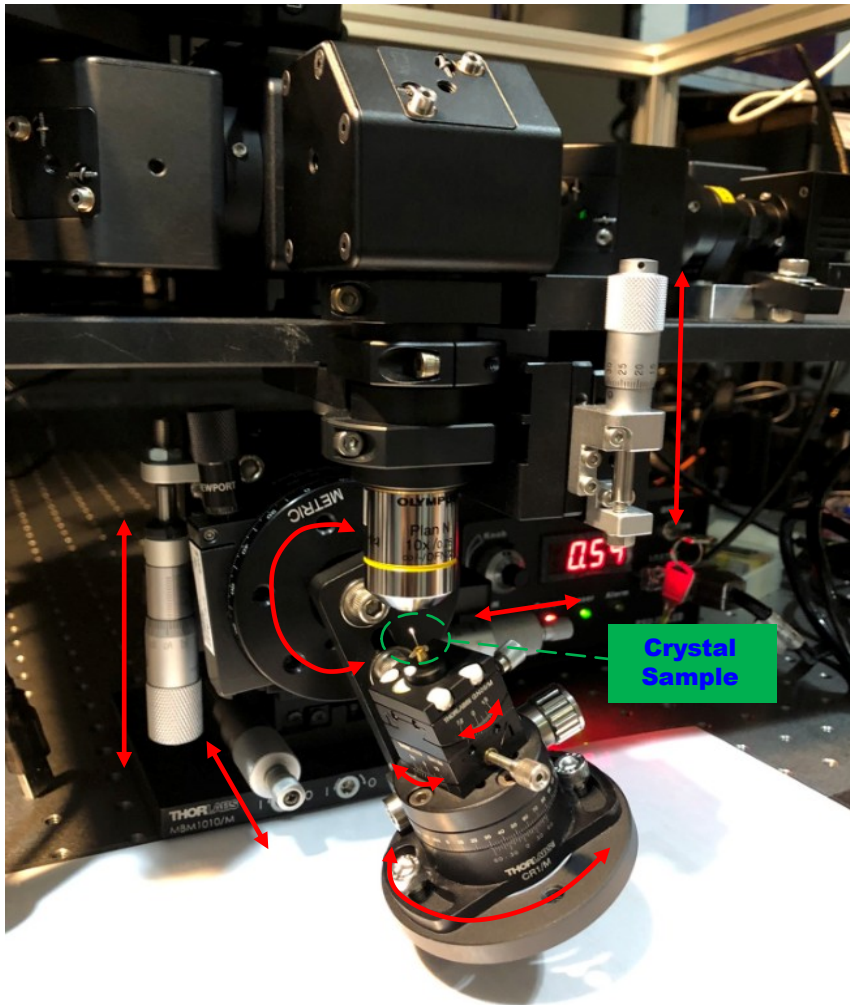
Crystal-CLSM System- Sample Stage



Side view



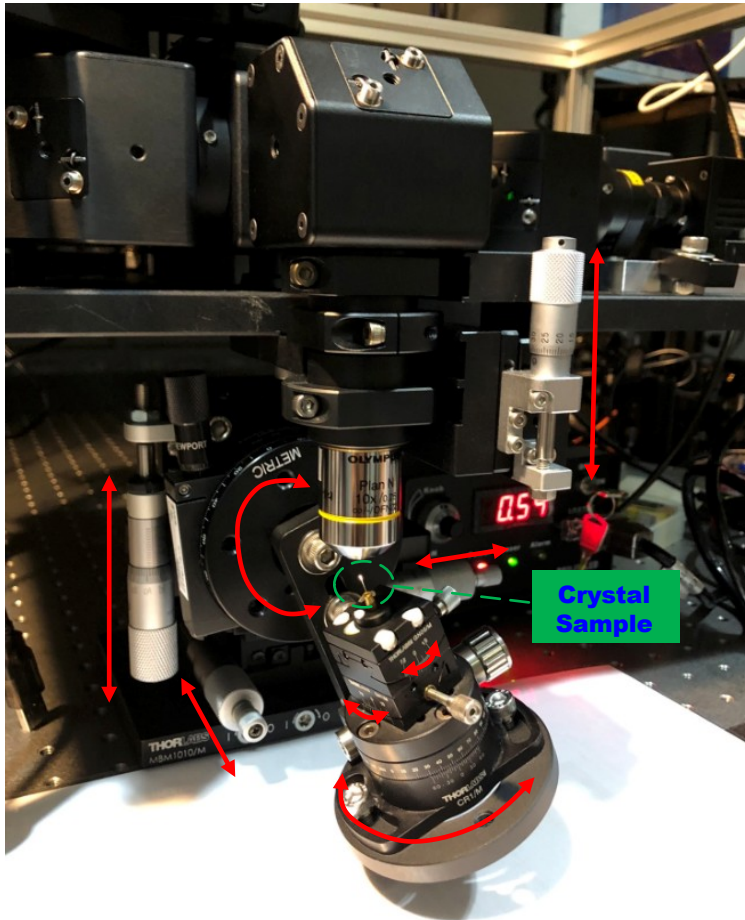
Crystal-CLSM System – Sample Stage



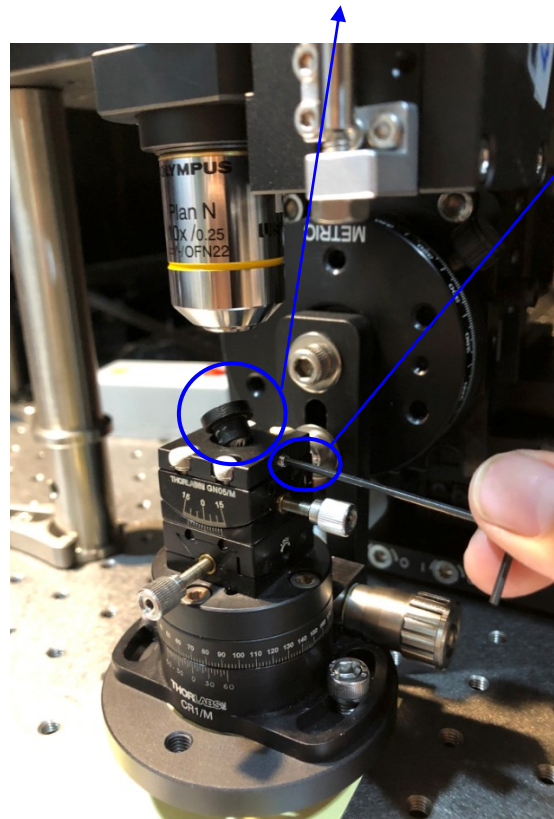
- ▶ Two main rotation stages
- ▶ Two tilt stages
- ▶ Xyz- translation stage
- ▶ Objective translation stage



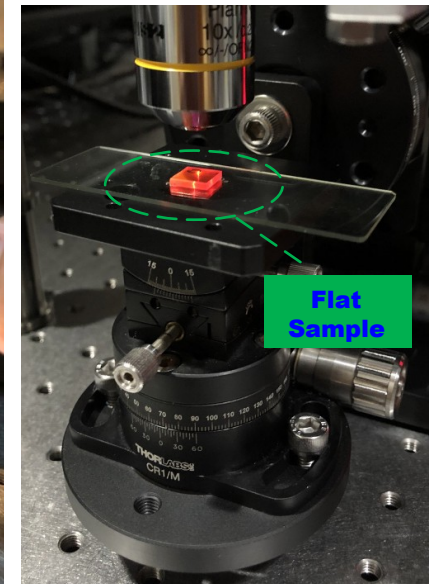
Goniometer Stage – also for flat samples



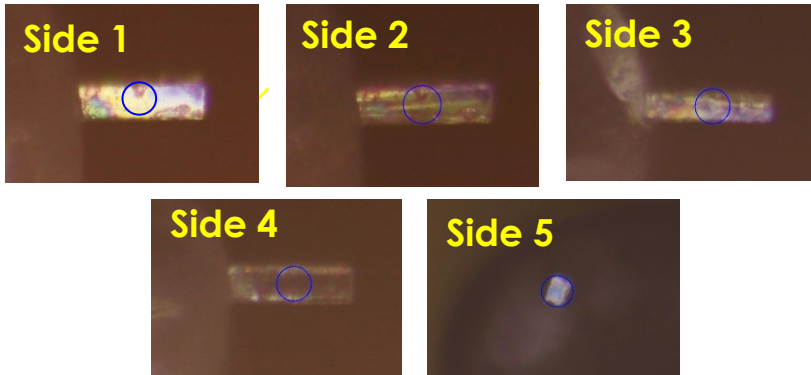
晶體載台可拆卸，以利放置平坦樣品
(請用水平儀確認水平狀態)



栓緊止付螺絲
可固定晶體載台

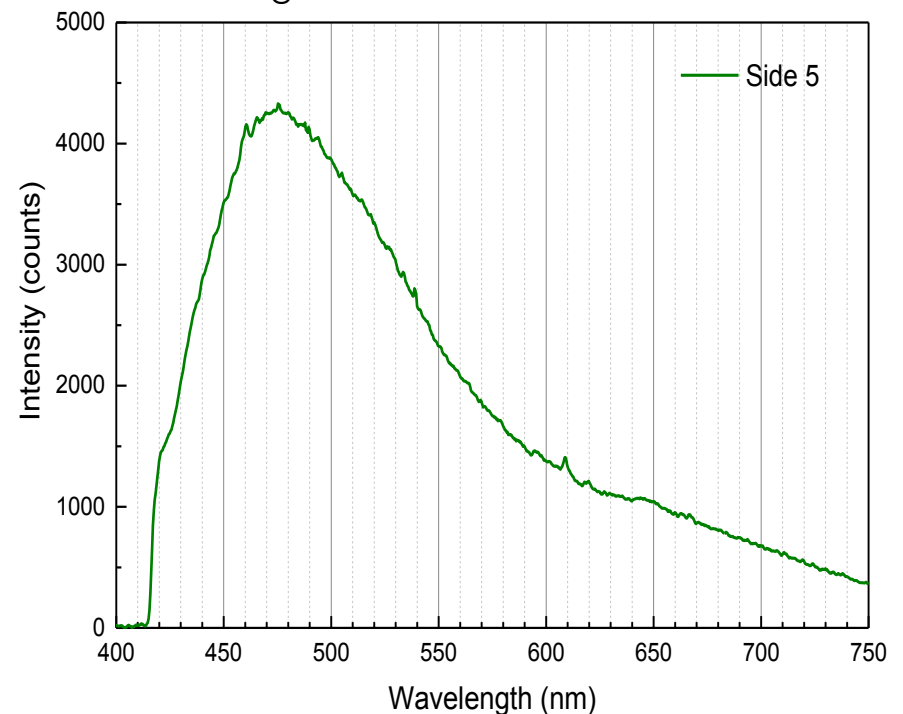
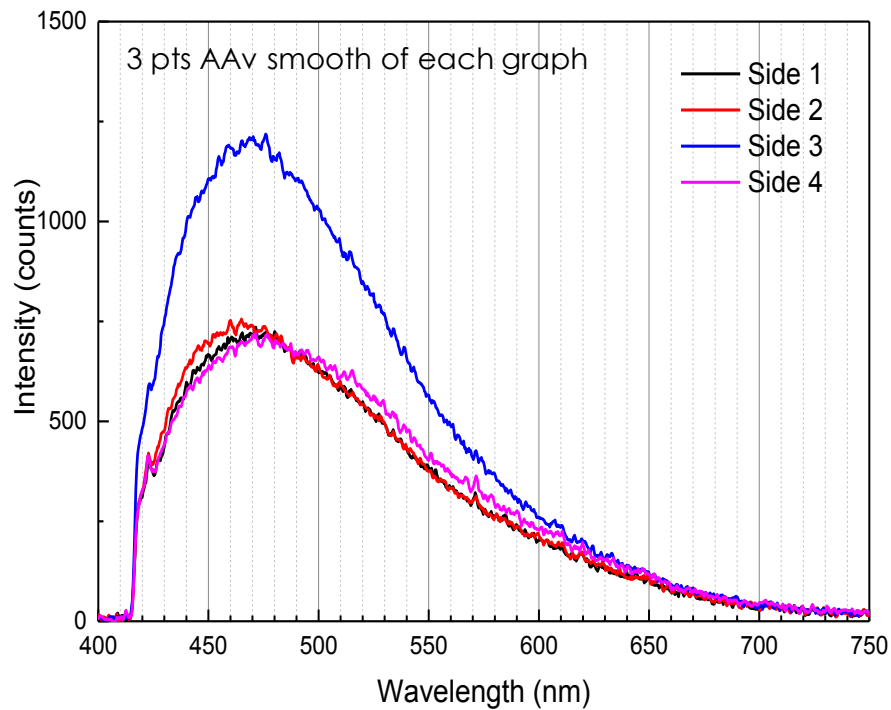


405nm PL (BaZrSiS₂)

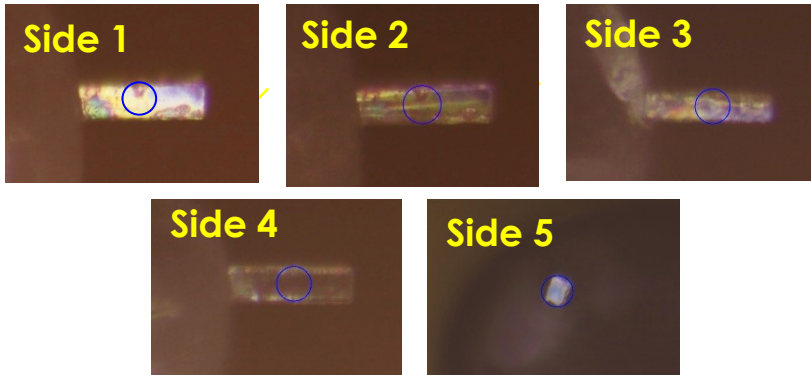


Measurement Condition :

- Single point
- Spectrometer : MR-Blue
- Grating : 300 gvs/mm
- Fiber : 105 μm
- Objective : 10x / NA0.25
- On sample power : 450 μW (ND2)
- Exposure time : 8s
- Average : 4

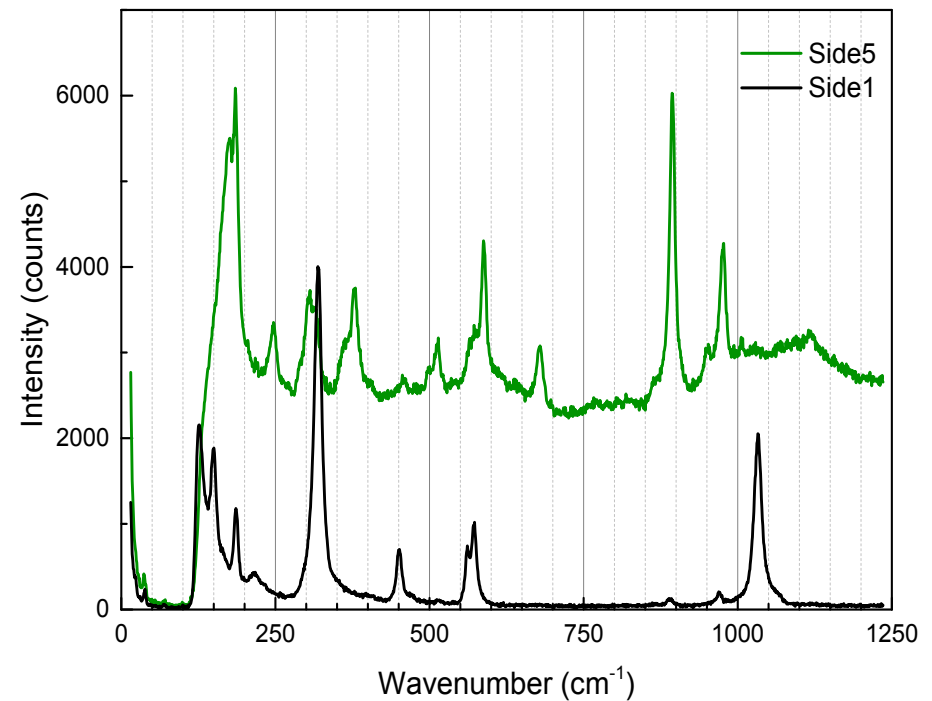
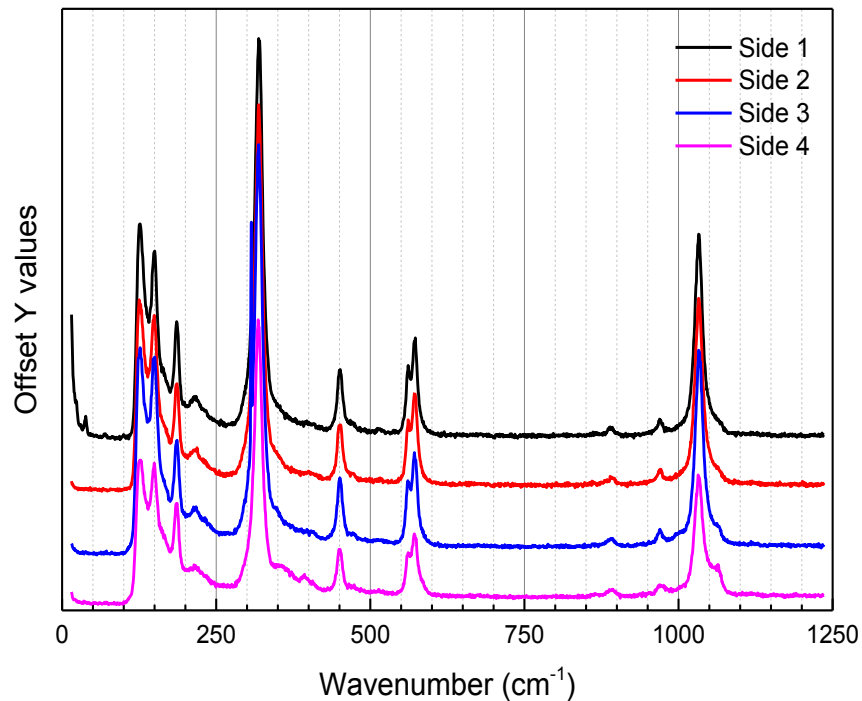


532nm Raman (BaZrSiO)



Measurement Condition :

- Single point
- Spectrometer : MR-Green
- Grating : 1200 gvs/mm
- Fiber : 105 μm
- Objective : 10x / NA0.25
- On sample power : 5.9 mW (ND1;0.65A)
- Exposure time : 8s (for Side1~4)/ 15s (for Side5)
- Average : 4



CRYSTAL-CLSM SUMMARY:

- ▶ 405nm micro-PL system
- ▶ 532nm micro-Raman system
- ▶ Easy switching between these two system
- ▶ Goniometer-like sample stage for easy manipulation of micro crystal samples
- ▶ Samples used for XRD can directly used for measurement without further preparation
- ▶ Fiber coupled output allows easy pairing with spectrometer