儀器中文名稱：高解析度小角度光散射儀

儀器英文名稱：Small Angle X-Ray Scattering System

儀器中文名稱：SAXS

儀器設備說明：

- 購置時間：94年1月安裝
- 開放服務：94年4月
- 放置地點：第二教學大樓102實驗室(T2-102 Lab.)
- 廠牌型號：Osmic, USA; PSAXS-USH-WAXS-002
- 規格：

Source(光源)：

Microsource with confocal beam conditioning optic(具點收束型集光鏡之微 X 光源)

(1) Provides monochromatic beam with intensity greater than focused radiation from existing rotating anodes with the exception of the Rigaku 007.(提供單一波長之光束，其光束強度高於，除了 Rigaku007 以外，現有之旋轉陽極靶所產生之聚焦輻射。)

(2) Operates at only 35 Watts and uses 110V VAC; no special power requirements needed(在 35 瓦的低功率下操作，並使用 110 伏特的交流電壓；不需特殊的功率。)

(3) Maintenance comparable to a conventional sealed tube source. (維修與傳統的密封管式的 X 光光源一樣簡單)

Camera(相機)：

(1)3 pinhole geometry with user-exchangeable pinholes(具使用者可更換針孔之三針孔幾何系統)

(2)Open Platform desin. (開放式平台設計)

(3)Large sample chamber with the optional ability to cover the incident and scattered beam paths with winows for samples in ambient or other non-vacuum environment.(大型的樣品室，具含蓋入射及散射光束路徑的選擇能力，並開有視窗，以利常壓或非真空環境下的樣品測量。)

(4)The smple changer drive mechanism is mounted outside the sample chamber to maximize the available space inside the chamber.(樣品更換器驅動機制是安裝於樣品室之外，以使樣品室內的可用空間最大化。)

(5)An xray photodiode is provided inside the sample chamber to be used for performance diagnostics and also fine tuning the alignment of the monochromator optic and the pinhole positions. (提供一個 X 射線光電二極管於樣品室內，用以診斷操作性能，及微調單光器光學系統是否對齊及針孔位置。)

(6)Vide display of the beam position on the sample simplifies the alignment of small samples. (打在樣品上的光束位置，可於影像上顯示，這簡化了小樣品的對齊調整過程。)

(7)The bemstop is embedded with an x-ray sensitive photodiode for in-situ transmission measurement. (光束停止點嵌入了一個對 X 射線敏感之光電二極体，以提供穿透 X 光強度的即時測量功能。)

Detector(偵測器) :

2D Multiwire, gas-filled proportional type with(二維、多接線、充氣比例類型具有):

(1)120mm active diameter(120 毫米之有效直徑。)

(2) Sub-microsecond time stamping for performing time resolved or periodic pump/probe experiments without waiting for data storage. (次微秒時間印記功能，以執行時間分離或週期性之泵送／探測實驗，不需等待資料儲存。)

服務項目：

- 一般測量(General Measurements(固態樣品、室溫、抽真空、及穿透模式下測量))

  (1)小角度 X 光散射測量(Small Angle X-ray Scattering, SAXS)

  散射角 2θ為 0.07-2.2°，散射向量 k (=4πsinθ/λ, nm^{-1}) range 為 5.4 x 10^{-2} - 1.6, D-spacing 為 115-3.8 nm。

  (2)中角度 X 光散射測量(Medium Angle X-ray Scattering, MAXS)

  散射角 2θ為 0.22-6.7°, 散射向量 k (=4πsinθ/λ, nm^{-1}) range 為 0.16 - 4.8, D-spacing 為 38-1.2 nm。

  (3)廣角度 X 光散射測量 (Wide Angle X-ray Scattering, WAXS)

  散射角 2θ為 6.5-67°, 散射向量 k (=4πsinθ/λ, nm^{-1}) range 為 4.6 - 45, D-spacing 為.3-0.14 nm。

  但如有特別需求，散射角 2θ的測量範圍可調為 2 - 67° (此時，吾人可使用中心鑽有直徑為 3.2 mm 小洞的 image plate；一般的 image plate，其中心鑽的小洞直徑為 7 mm，故最低的散射角只能測至約 6.5°)

- 液態樣品測量(Measurements for liquid sample) (液態樣品、室溫、抽真空、及穿透模式下測量)
- 常壓下測量(Measurements under ambient pressure, SAXS 或 WAXS)

樣品準備須知

- 室溫測量條件下，固體樣品試片或薄膜尺寸 (size suggested for solid specimen or film under room temperature)：3 to 5 cm (length), 0.5 to 1 cm (width), and less than 1 to 2 mm (thickness). (The sample will be fixed on a sample rack with 42 holes (about 1 cm in diameter) on it using a 3M Scotch tape.)
- 變溫測量條件下(20-300C)，固體樣品試片或薄膜尺寸 (size suggested for solid specimen or film under varied temperature (20-300 C))：0.5 cm (length), 0.5 cm (width), and less than 1 to 2 mm (thickness). (The sample will be placed on a temperature-controlled liquid sample cell with sample size limitation mentioned above.)
- 固體粉末數量 (amount of powder): at least 0.5 to 1 cubic cm of the powder should be provided. (The sample will be put into a special quartz capillary (1 or 2 mm in OD, 0.1 mm in wall thickness, and 80 mm in length, which is imported from USA), and its one end will be sealed with a tape.)
- 固態樣品需無毒、無(或極低)揮發性、且無輻射性 (The sample should be free from poison, volatility, and radiation.)
  室溫測量條件下(20℃)，低黏度液體樣品溶液： at least 0.5 to 1 cubic cm of the low-viscosity liquid sample should be provided. (The sample will be put into a special quartz capillary (1 or 2 mm in OD, 0.1 mm in wall thickness, and 80 mm in length, which is imported from USA), and its one end will be sealed with epoxy.) Please be noted that the user should also provide at least 0.5 to 1 cubic cm of pure solvent sample for the X-ray scattering experiment in order to facilitate the background subtraction from the sample solution.
- 樣品若需沈積在基板上，基板的材質及厚度，不可讓 X-ray 對基板的吸收度高於 90%以上，否則樣品將無法在穿透模式下測量。建議使用 0.1mm 厚度以下的矽晶片或石英玻璃片為佳。(If the sample has to be deposited on a substrate, the material and thickness of the substrate should not cause the degree of absorption of the incident X-ray greater than 90%. Otherwise, the sample will probably not be able to be measured its scattered intensity under the transmission mode of the test. It is suggested to use silicon wafer or quartz glass plate with a thickness less than 0.1 mm.)

收費標準：

計費項目	計費單位	計費數量	計費單價
儀器使用費(科技部計畫)	小時	4	8000
儀器使用費(全額現金)	小時	4	6000
盛裝粉末樣品用石英毛細管耗材(科技部計畫)	支	1	4000
盛裝粉末樣品用石英毛細管耗材(現金付費)	支	1	400

* 使用本實驗室準備自美國進口之石英毛細管者，每枝毛細管額外收取新台幣 400 元材料費(限現金，請至本校總務處出納組繳納)。

** 一個服務單元為 4 小時；未滿 4 小時，一律以 4 小時計。

***實驗結果及圖形，在您的服務單元結束後，立即取回。請自備隨身碟儲存檔案資料。

服務對象：校內、校外學術單位及產業界

Service Time for High Resolution SAXS System

	Mon	Tue	Wed	Thur	Fri
8:30 am-12:30 noon	3	2	1	2	1
13:30 pm-17:30 pm	3	2	1	2	1

- 校內貴儀使用者預約 (reserved for faculty members or graduate student at NTUST having MOST account entitled to use precious instruments of the MOST-sponsored labs)
- 校外貴儀使用者預約 (reserved for faculty members or graduate student from other university or research organization having MOST account entitled to use precious instruments of the MOST-sponsored labs)
- 願意繳交現金之使用者預約 (reserved for applicants willing to pay cash to use the SAXS system)
- 每月第二及第四個週一，儀器停機一天，更換針孔系統及光束停止點。遇假日則順延至次一個上班日。 (For the second and fourth Monday of each month, the SAXS system will be down for changing the pinhole and beamstop. Should it be a holiday for that Monday, the down time for the SAXS system will be delayed to the nearest working day.)

聯絡資訊：

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