

()

IC 가 , feature 가

feature 10 1 10 nm

가

가

0.10~0.08 μ m

가

COPs(crystal-originated pits),

가

가

가

가

XY

가

(前記)

SEM/EDX

TRXRF(total reflection X-ray

fluorescence analysis)가

가

가

X-ray

TRXRF

가

Al

()

가

FL-AAS(flameless atomic absorption spectrometry)

ICP-MS(inductively coupled plasma mass spectrometry)

TDS(thermal desorption spectroscopy)

APIMS(atmospheric pressure ionization mass spectrometry)

가 . Si

XPS(X-ray photoelectron

spectrometry) FTIR(Fourier transform infrared spectrometry)

1. Total reflection X-ray fluorescence spectrometer (TXRF)

TXRF X (total reflection)

- - 가

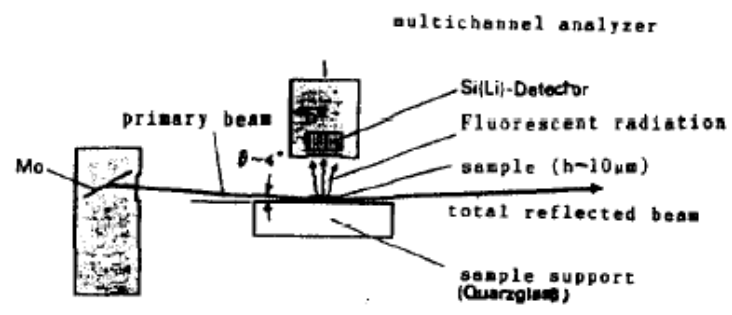


Fig. 1. Simplified design of total reflection X-ray fluorescence Spectrometer

C, O 가

TXRF가

가

TXRF X-

X_p 가 10nm

vaporization , μm cathodic sputtering nm

2. Atomic force microscopy (AFM)

AFM (Probe Tip)

Scanning ,

가 . STM

(Tunneling Current)가 , AFM

Scanning

. AFM

SFM(Scanning Force Microscopy)

()

Contact Mode Dynamic Mode가

가 UHV

가

Si₃N₄ Si Cantilever가

AFM

. STM (Tip) W Pt/Ir 가

. STM 가 ,

가 ,

AFM STM

가 ,

가

STM

. STM

STM

Height Mode 가 가

. STM

Constant Current Mode

SPM

Constant

AFM

STM

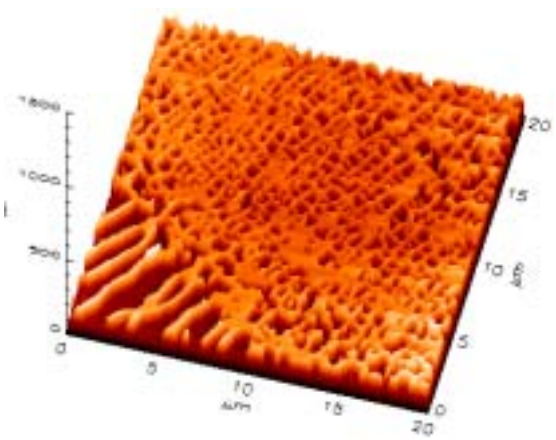
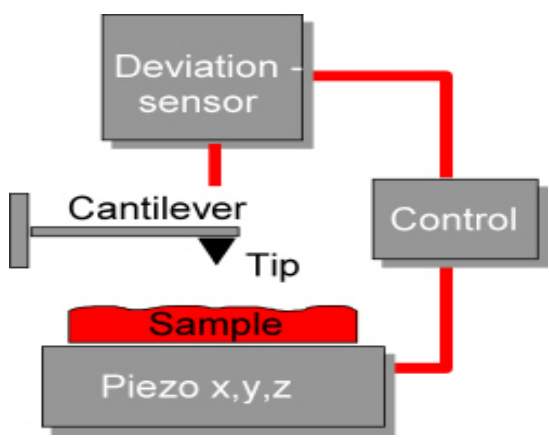


Fig. 2. AFM

3. X-ray photoelectron spectroscopy (XPS)

X- ()
 100 (10)
 가 X () (photoelectron)
 binding energy
 binding energy

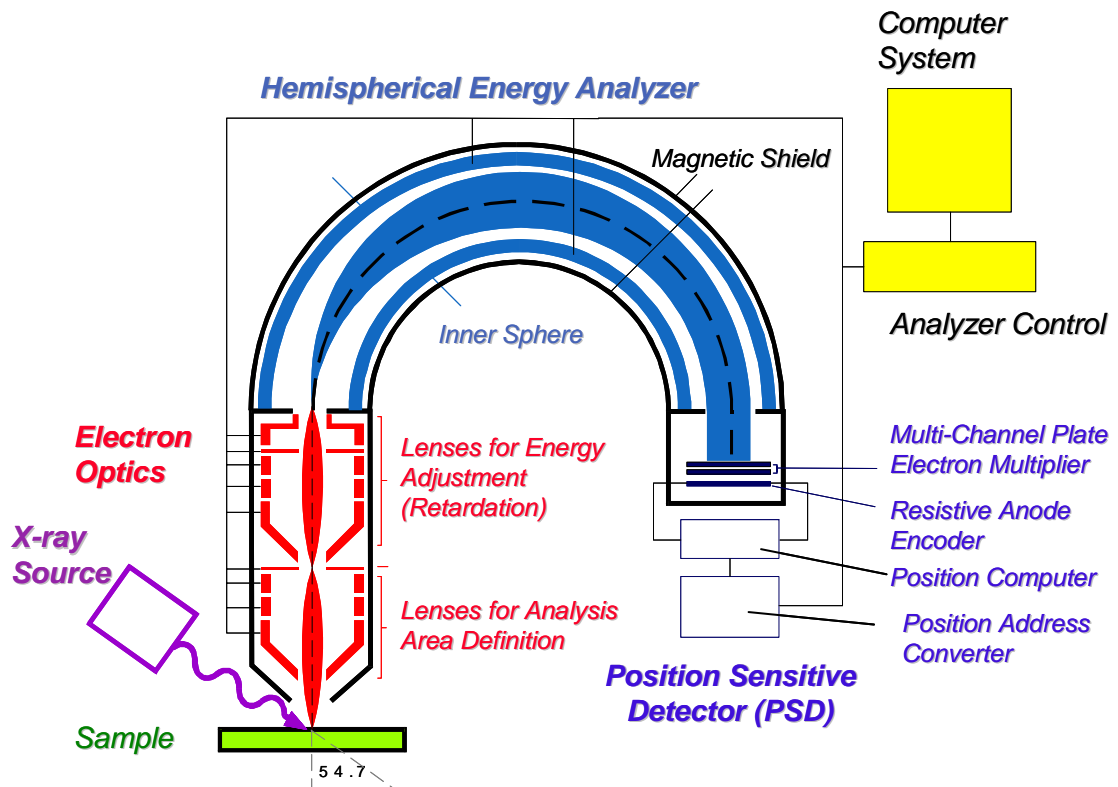


Fig. 3. XPS

XPS

가 가

()

4. Fourier transform infrared spectrometer (FT-IR)

FTIR Michelson interferometer
(optical pathway) (interferogram)

IR

() ()

가

(Time domain spectrum)

INTER-FEROGRAM

가

(, frequency domain

spectrum) . Fourier transform(FT)

Fourier transform infrared spectrometer(FTIR)

FTIR

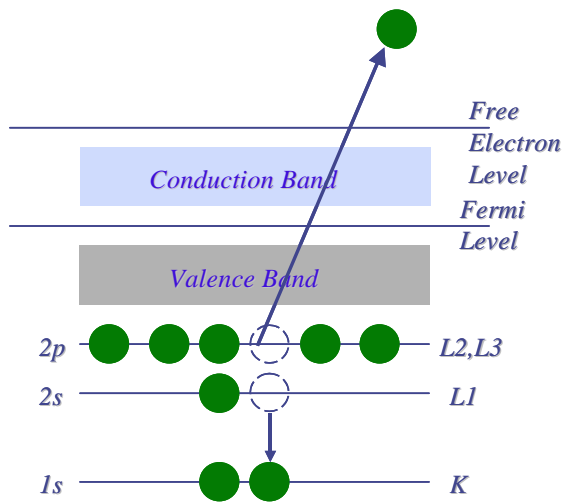
/ (signal to noise ratio)

FTIR

5. Auger electron spectroscopy (AES)

Angstrom electron beam

Auger



- L electron falls to fill core level vacancy (step 1).
- KLL Auger electron emitted to conserve energy released in step 1.
- The kinetic energy of the emitted Auger electron is:

$$KE = E(K) - E(L1) - E(L3)$$

Figure 4. Schematic diagram of the Auger electron emission process

(1) Auger Image Mapping

electron analyzer

Auger

Auger

(2) Auger Spectra :

- : N(E)

N(E)

가 .

Auger

- : N(E)

Auger

(element sensitivity factor)

(3) (Depth Profiling)

가

(Ar⁺)

Ion gun

computer

Charging Effect

가

< >

- 가
- 가

- : gold coating, silver paste

- (0.1%)
- Bulk