

NearIR-Visible Spectrophotometer

- Near Infrared Spectroscopy

- NIRVIS system

- NIRVIS
- NIRVIS
- NIRVIS
- Accessories

NIR Spectroscopy (Near Infrared Spectroscopy)

■ NIR : 800nm - 2500nm (4000cm⁻¹ ~ 12,500cm⁻¹)

■ O-H, C-H, N-H harmonics combination 가

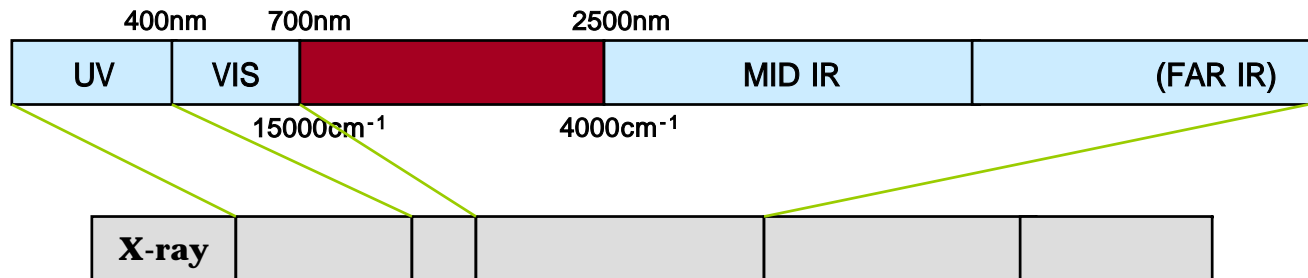
■

-> Chemometric

■ NIR 가 .-> .->

-> 가 .

■ , -> .



NIR Chemometric

■ 1950

■ 1968

Dr. Karl Norris (), NIR
(
(Multiple Linear Regression) NIR
(NIR)

■ 1970

, (In-process)

■ 1970

, NIR ,

■ 1980

, , , , , , ,

■

FT-NIR Chemometric software



(FTIR Spectroscopy)

NIR

(Near Infrared Spectroscopy)

(Mid IR)

Mid-IR (400 - 4000cm⁻¹)

가

functional group

가

NIR (4,000 - 10,000cm⁻¹)

Overtone

Combination

가

Mid-IR

가

MLR, PLS

MID IR

가

KBr

Chemometric

가

가

NIR

NIR

- NIR chemometrics
1000nm ~ 2500nm

•

scanning 가
가

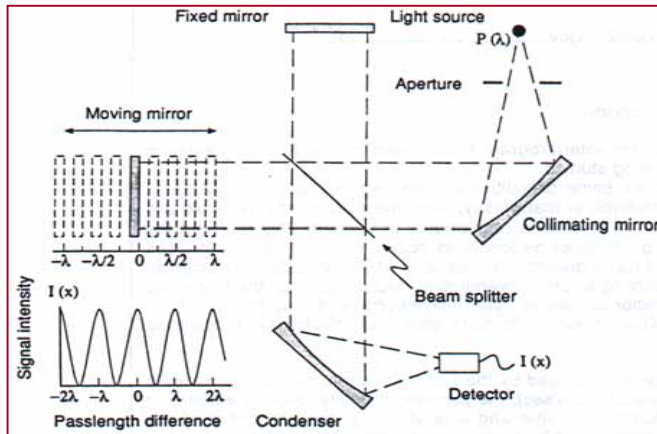
FT-NIR

- Fourier Transform
- 가 .
- S/N가 .
- : Michelson inteferometer type,
Quartz Wedge Interferometer type
- (On-line), (At-line)
LAB (Off-line)

FT - NIR

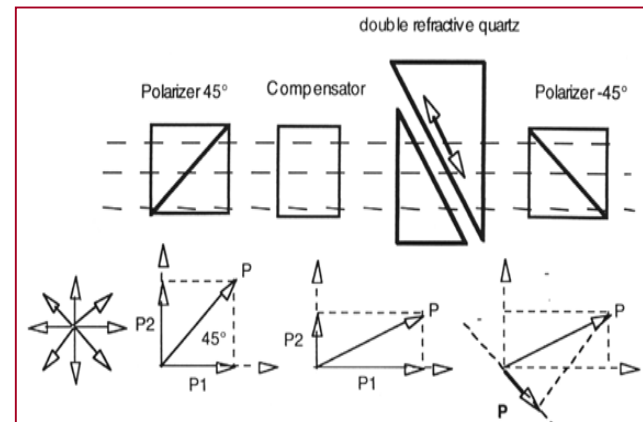
Michelson interferometer

Beam splitter Fixed Mirror
 Moving Mirror
 interferogram
 Moving Mirror가
 portable type ,
 On-line .

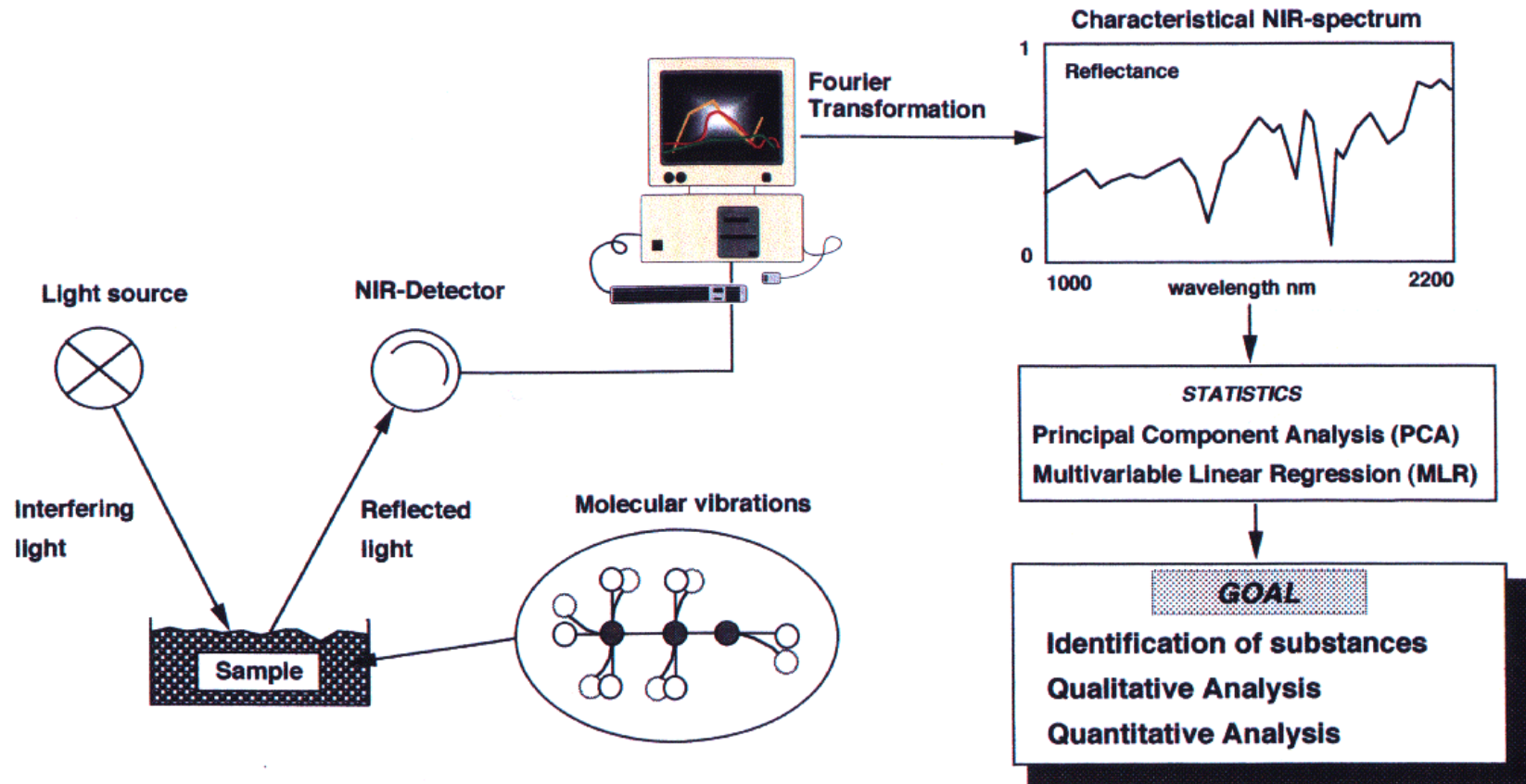


Quartz Wedge Interferometer type

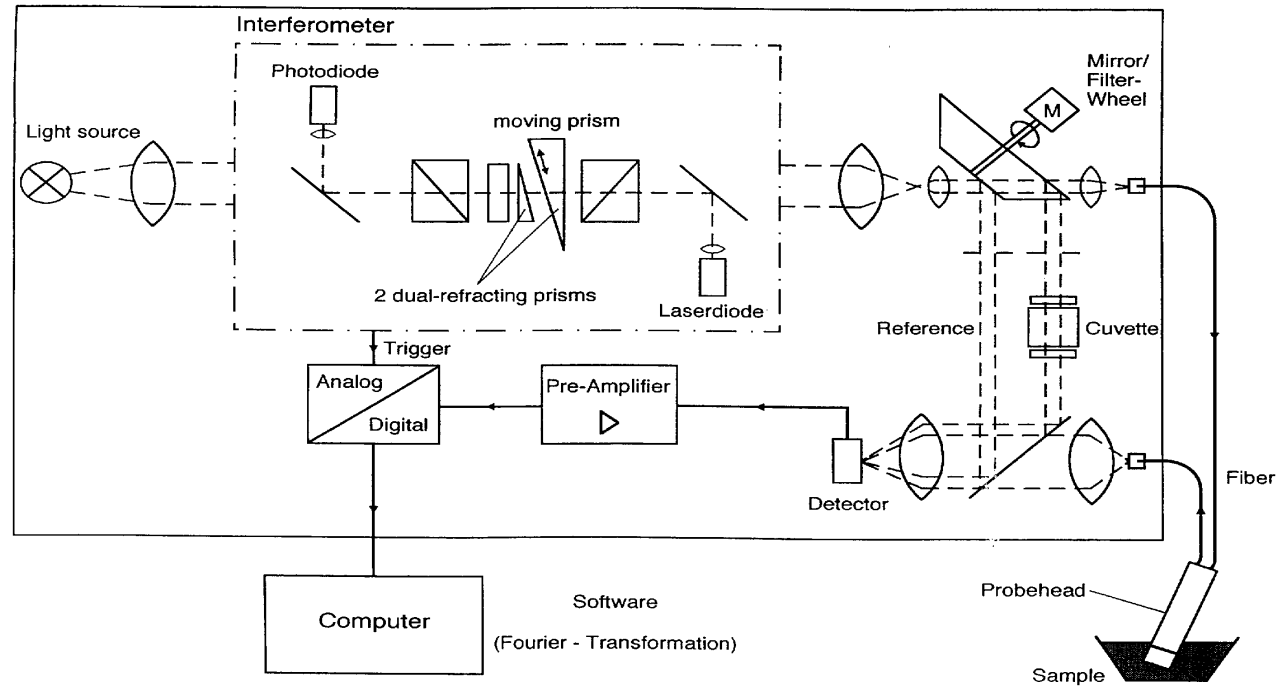
Double refractive prism (oriented
 quartz plate (d)가
)
 interferogram .
 가 100
 - . - Portable type
 . (,)



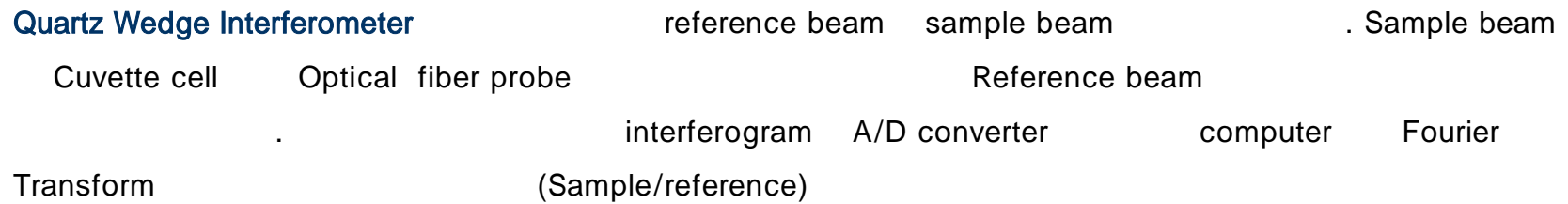
NIRVIS



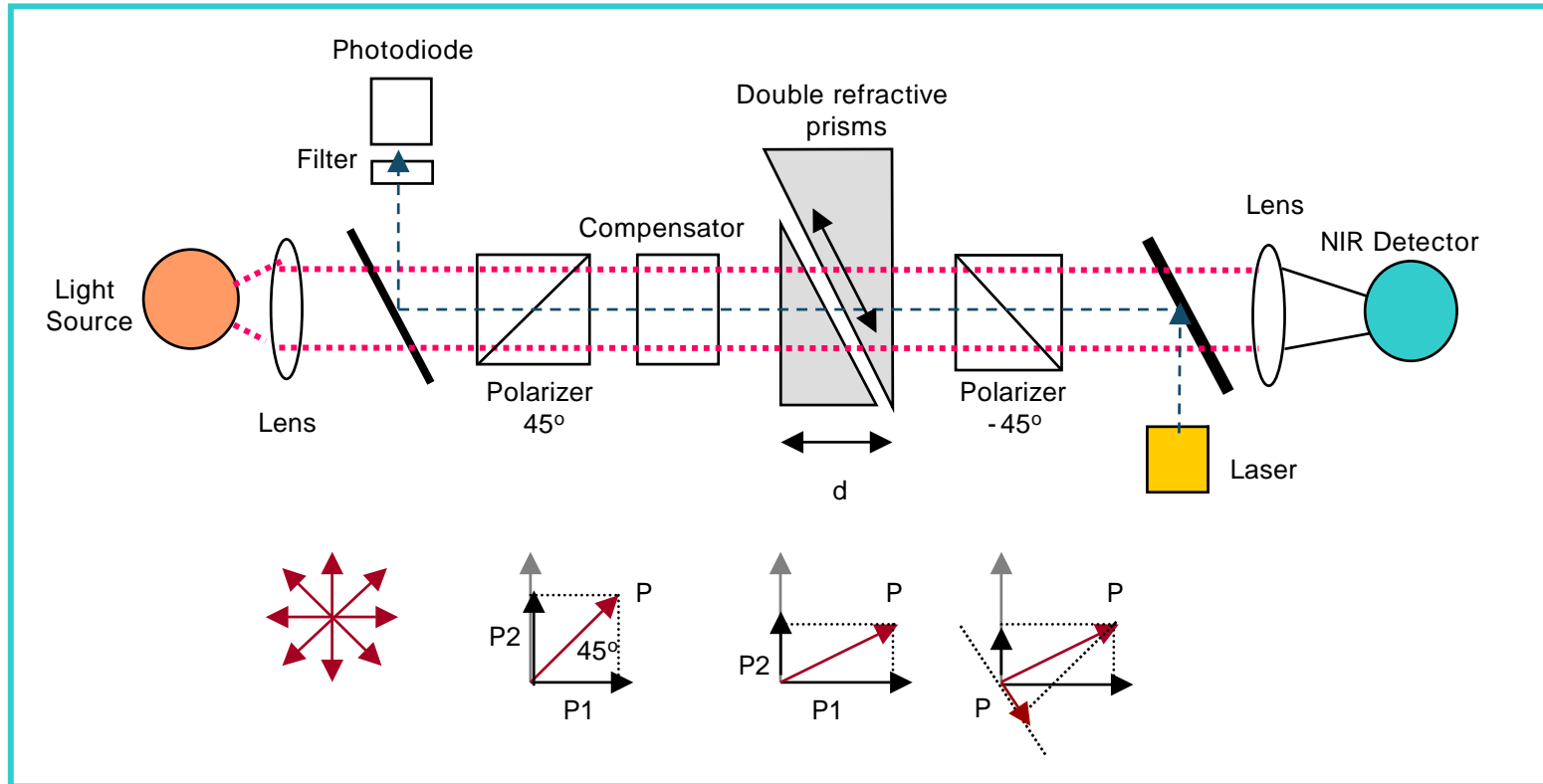
NIRVIS



Quartz Wedge Interferometer



Quartz Wedge Interferometer



$+45^\circ$ intensity 90° birefringent wedge -45° polarizer intensity double refractive prism
 가 가 가 가 "0"

Quartz wedge interferometer

Buhler Quartz wedge interferometer quartz
 beam extraordinary beam d Quartz ordinary plate
 ($\Delta\phi$) 가 . $\Delta\phi = 2dk (n_o - n_{ao})$ (k - wavenumber of light, n_o, n_{ao} - refractive index for ordinary and extraordinary beams, respectively)
 interferometer quartz plate interferogram
 quartz quartz quartz plate
 quartz plate

Michelson interferometer Vs Quartz wedge interferometer

Quartz (no - nao)가 0.01 quartz wedge가
 . Michelson interferometer Quartz wedge interferometer quartz plate
 가 () 100
 Quartz wedge inerferometer가 Micheson interferomter
 . Michelson interferomter 가 .

High precision

interferogram NIR source photodiode Laser () interferogram
 NIR interferogram calibration .

NIRVIS

-
- Sugar
-
-
- (PVC, PVDC, PE, PP...)
- (Lactoses, fillers, chemicals)
- Sugar

-
-
-
- (phosphates, Chloride, acetate salts)
-
- (carboxylic acids, amines, aldehyde resin)

-
-
- , 가
-

- (, ,)
-
-
- (, , ,)
-

- &
- Homo- / copolymer
 - , 가
 -
 -
 - 가

- ,
-
-
- ,
- (Homogenisation degree)

Accessories - Transmission Method

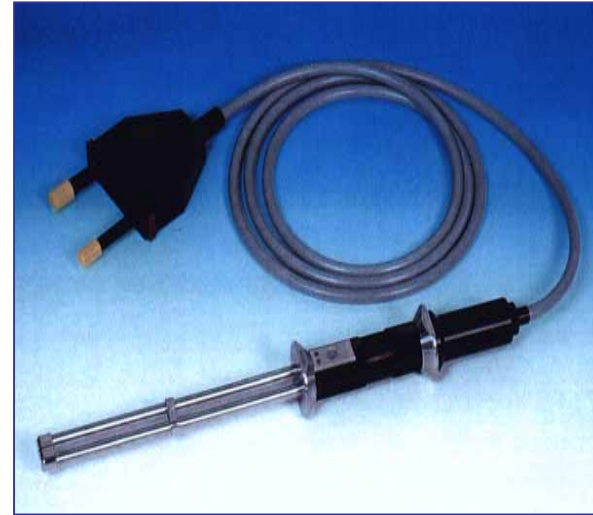
Cuvette



Cell

Glass, Quartz,
PMMA micro cell (Disposable cell)

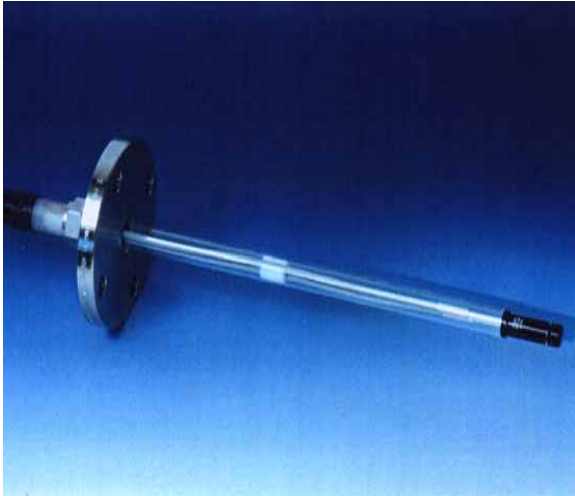
Transmittance probe



- Remote control system
- Single fiber 3m, 1.5mm path length
- tanks,
- Acid, Base, Media, Organic solvent remote control (100m)
-

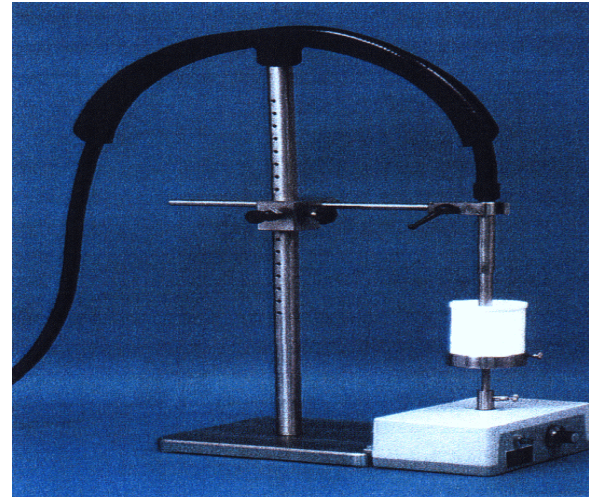
Accessories - Transmission Method

Quartz glass probe



- Transmittance probe
- Total length 400mm, depth 300mm, probe diameter 18mm, Quartz glass suprasil 300
- Path length : 1mm, 2mm, 5mm, 10mm
- (,) , solvent

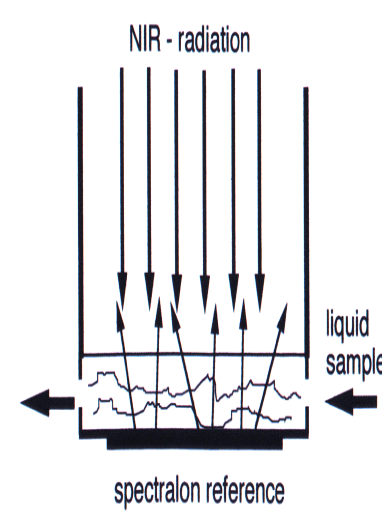
Rotating sampling system



- Transmittance method
- Optical fiber head sample
- : Teflon vessel
- ->

Accessories - Transflectance method

Transflectance probe TFKO accessory (Transflectance method)



- : Optical fiber probe Transflectance kit
- : , , Gel, , 가
- Path length : 0.5, 1.0, 1.5, 2.0, 3.0mm()
(path length distance ring)
- : ,Cuvette