Measurement of 3D Fluorescent Spectra (Fluorescence Fingerprint) of Milk

INTRODUCTION

F-7000 fluorescence spectrophotometer, with its highest level of 3D fluorescence spectra (fluorescence fingerprints) for the instrument class, is used in a wide range of applications from the cutting edge research to quality control. The fluorescence fingerprint of milk was obtained to understand its fluorescence characteristics. The time required for the wavelength region measured this time is about 2 minutes. When analyzing liquid samples do not transmit light, such as milk, a solid sample holder is used to measure the fluorescence from the surface of the sample. By measuring the fluorescence on the surface, the fluorescence characteristics of undiluted milk could be understood and it was possible to confirm four characteristic fluorescence peaks (i) – (iv). The fluorescence fingerprint (i) shown near the excitation wavelength of 280 nm and the fluorescence wavelength of 340 nm is a fluorescence peak originating from a protein-constituting amino acid.

SAMPLE	ACCESSORY
Sample: Milk 	Solid sample holder (P/N: 650-0161) GL Sciences S20 Standard cell with round corner bottom (6210-21203)

ANALYTICAL CONDITIONS

Instrument: F-7000
Excitation wavelength range: 220-520 nm
Fluorescence wavelength range: 250-650 nm
Slit on excitation side: 2.5 nm
Slit on fluorescence side: 5.0 nm

Scan speed	: 60000 nm/min	Filter	: (a) WG295
Response	: Automatic		(b) Y43
Detector	: R928F	Full scale	: 10000
Photomultiplier Vol.	: 400 V	Contour line interval	: 5

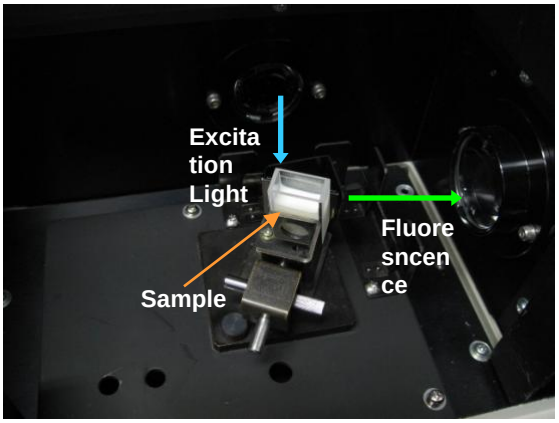

Figure 1 Appearance of Sample Setting

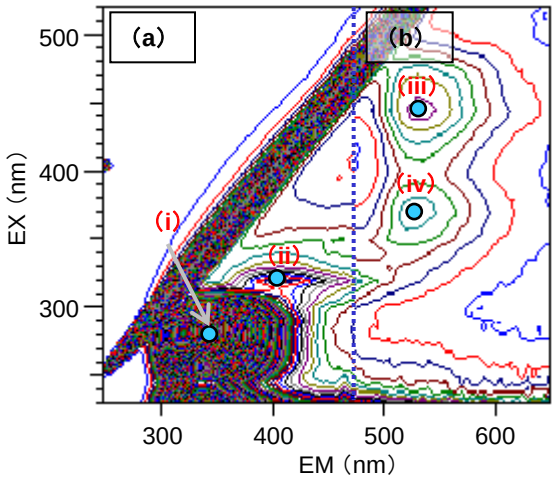

Figure 2 3D Fluorescence Spectrum of Milk (Undiluted Solution)

Note: The 3D fluorescence spectra (a) and (b) shown on this page were measured separately and combined into a figure. It is not what is displayed in FL Solutions.

KEY WORDS
Bio/Medical Science/Food/Pharmaceutical, Food, Milk, Washing, Food Inspection, Quality Control, Process Control, Quality Determination, Fluorescence Fingerprint, 3D Fluorescence Spectrum, FL, F-7000

Fluorophotometer (FL)

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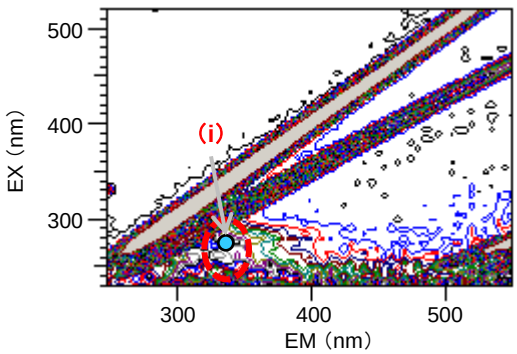
INTRODUCTION

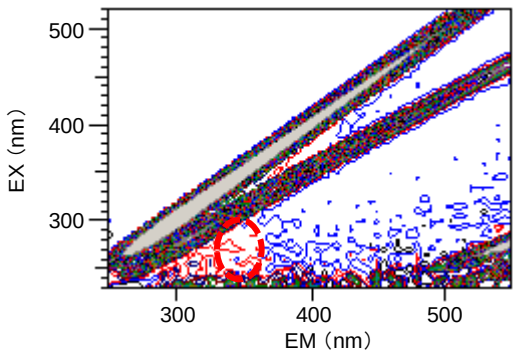
It is known that beverages containing a large amount of protein and milk fat, such as milk, are insoluble and the components tend to remain in containers, etc.
As one example, one milk sample prepared by diluting milk to a low concentration to simulate milk remaining in water used for rinsing was analyzed to confirm the washing condition of containers or tubes. The sample was transferred into a 10 mm rectangular cell.
The overlay of the fluorescence spectrum at the excitation wavelength of 280 nm obtained from a milk sample diluted to 1 mg/L with purified water and the one from a low concentration range (0.1-10 mg/L) is shown.

ANALYTICAL CONDITIONS

Instrument	: F-7000	Slit on excitation side	: 5.0 nm	Photomultiplier Vol.	: 400 V
Excitation wavelength range	: 230 - 520 nm	Slit on fluorescence side	: 10.0 nm	Filter	: WG295
Fluorescence wavelength range	: 250 - 550 nm	Response	: Automatic	Full scale	: 10
Scan speed	: 60000 nm/min	Detector	: R928F	Contour line interval	: 0.1



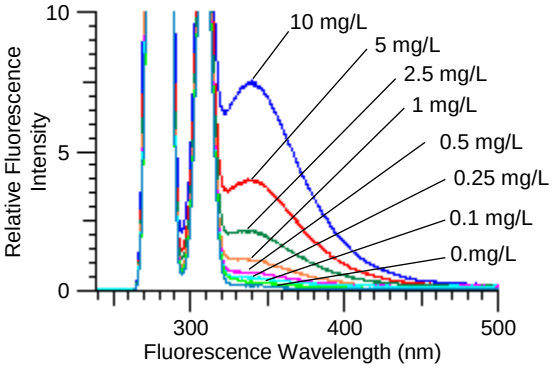
3D Fluorescence Spectrum of Diluted Milk Solution (1 mg/L)



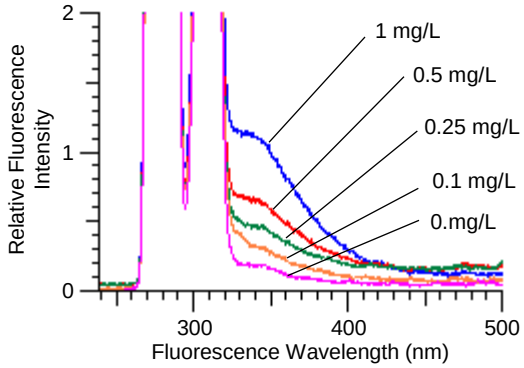
3D Fluorescence Spectrum of Blank (Purified Water)

ANALYTICAL CONDITIONS

Instrument	: F-7000	Slit on excitation side	: 5.0 nm	Detector	: R928F
Excitation wavelength	: 280 nm	Slit on fluorescence side	: 10.0 nm	Photomultiplier Vol.	: 400 V
Fluorescence wavelength range	: 240-500 nm	Response	: Automatic	Filter	: WG295
Scan speed	: 240 nm/min				



Fluorescence Spectrum of Diluted Milk (0.1 - 10 mg/L)



Fluorescence Spectrum for a Low Concentration Range (0.1 - 1 mg/L)

When the 3D fluorescence spectra obtained from the diluted milk (1 mg/L) and purified water are compared, the fluorescence fingerprint originating from milk can be confirmed at the low concentration of 1 mg/L. In addition, the fluorescence can be confirmed in the fluorescence spectrum at the concentration of 0.1 mg/L.
As described above, by focusing on the fluorescence emitted by a sample itself (auto-fluorescence), the sample remaining in the rinsing water can be easily detected with high sensitivity without any preparation.

KEY WORDS

Bio/Medical Science/Food/Pharmaceutical, Food, Milk, Washing, Food Inspection, Quality Control, Process Control, Quality Determination, Fluorescence Fingerprint, 3D Fluorescence Spectrum, FL, F-7000

Fluorophotometer (FL)

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