

# Distinction of the Grain Flour of Multi-Specimens by 3-D Fluorescence Spectra Measurement (Fluorescence Fingerprint) using the Microplate Reader Accessory

## INTRODUCTION

Currently, in fields including the food field, the study to apply a 3D fluorescence spectrum (fluorescence fingerprint), with a large amount of sample-specific numerical data, for the determination of agricultural product origins and the evaluation of grain powder types and grades is being conducted.

In general, chemical analysis is used for the analysis of foods and agricultural products. However, the preparation is necessary and it takes a long time to analyze multi-specimens.

On the other hand, the analysis by a fluorescence spectrometer, which provides a sample-specific fluorescence fingerprint, characteristically allows the direct measurement of a sample without any preparation.

This time, an example of the analysis by the microplate reader accessory, which allows the efficient 3D fluorescence measurements of multi-specimens at the highest scan speed for the instrument class (60000 nm/min), is introduced here. The microplate is usually used for the multi-specimen analysis of solution samples. However, it was used to analyze solid sample as its structure allows the fluorescence measurement on the sample surface.

SAMPLE	ACCESSORY
Sample: wheat flour, rye flour, corn flour, potato flour, pumpkin flour, rice flour, brown rice flour, soybean flour	Microplate reader accessory (P/N : 5J0-0139)  Nunc FluoroNunc plate (Cat No.237108)

## ANALYTICAL CONDITIONS

Instrument	: F-7000				
Excitation wavelength range	: 200 - 550 nm	Scan speed	: 60000 nm	Full scale	: 500
Fluorescence wavelength range	: 200 - 550 nm	Response	: Automatic	Contour line interval	: 10
Slit on excitation side	: 5 nm	Detector	: R928F		
Slit on fluorescence side	: 5 nm	Photomultiplier Vol.:	400 V		

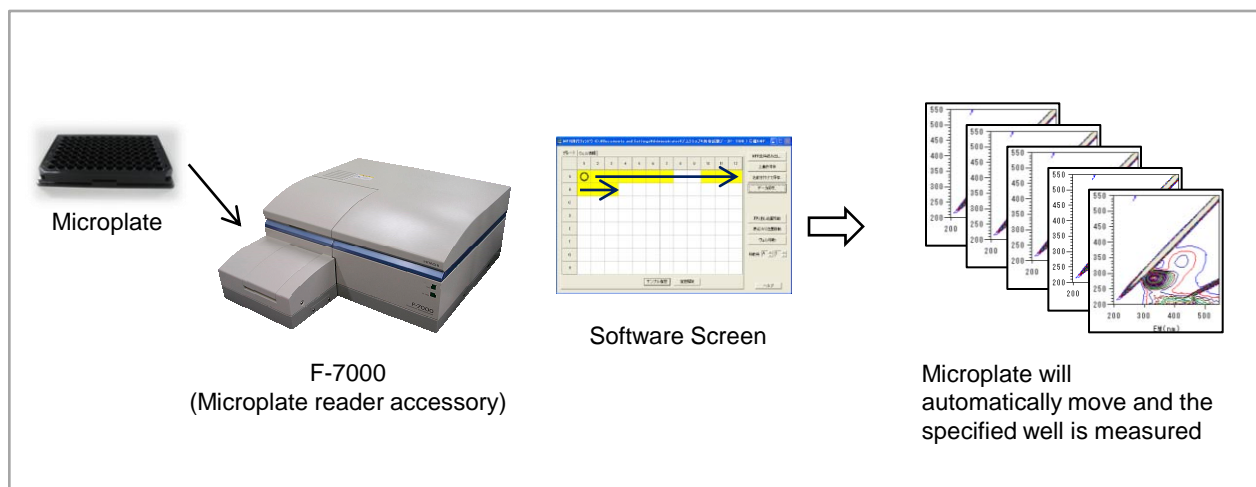


Figure 1 Outline of Microplate Reader Accessory

### KEY WORDS

Bio/Medical Science/Food/Pharmaceutical, Food, Grain Flour, Powder, Food, Fluorescence Fingerprint, Quality Determination, Distinction Analysis, EEM, 3D Fluorescence Spectrum, Microplate, FL, F-7000

Fluorophotometer (FL)

Sheet No. FL130003-01

## Distinction of the Grain Flour of Multi-Specimens by 3-D Fluorescence Spectra Measurement (Fluorescence Fingerprint) using the Microplate Reader Accessory

The microplate was filled with eight types of grain flours such as wheat flour (all-purpose flour) and rye flour (N=3, total 24 specimens). The specimen surfaces were evened to ensure the photometric accuracy and the 3D fluorescence spectra were measured.

In the 3D fluorescence spectrum of the wheat flour, two characteristic fluorescence fingerprints (Peak A: excitation wavelength of 290 nm, fluorescence wavelength of 330 nm, Peak B: excitation wavelength of 335 nm, fluorescence wavelength of 425 nm) were confirmed.

Peaks A and B of the wheat flour are shown in the 3D fluorescence spectra of other grain flours (Figure 2) for the easy comparison. A different fluorescence fingerprint was obtained for each powder.

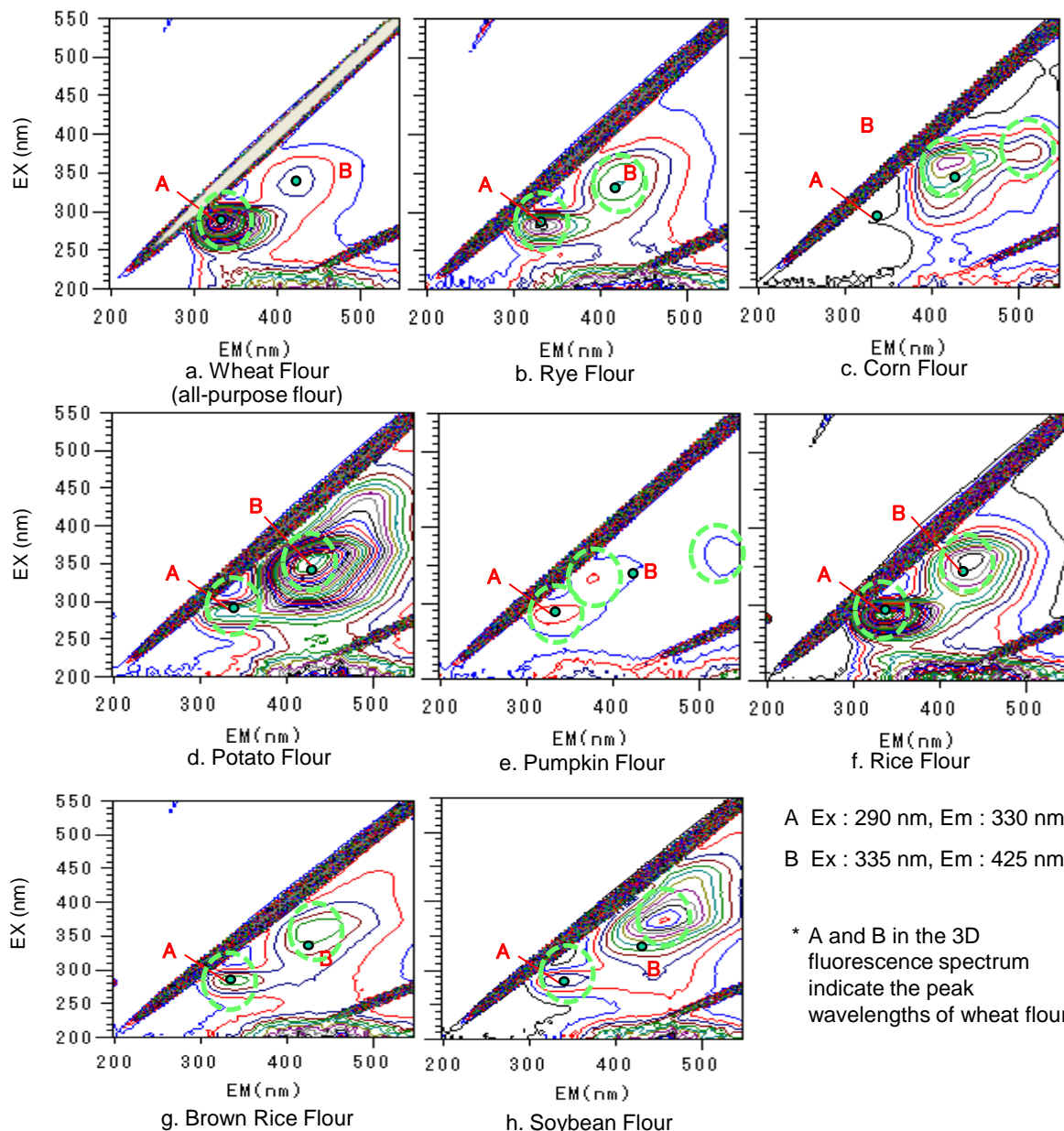


Figure 2 3D Fluorescence Spectra

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Fluorophotometer (FL)

Sheet No. FL130003-02

## Distinction of the Grain Flour of Multi-Specimens by 3-D Fluorescence Spectra Measurement (Fluorescence Fingerprint) using the Microplate Reader Accessory

By using the peaks A and B found in the wheat flour, the grain powder type was estimated. The scatter diagram normalized (with the wheat flour as the standard) based on the obtained fluorescence intensity is shown in Figure 3. As a result, the trend was found to be different for each sample and the possibility of its application for the type distinction was confirmed.

By using the microplate reader accessory, 3D fluorescence spectra of multiple specimens can be measured easily and efficiently. Thus, the application in research fields for many types of food raw materials can be expected.

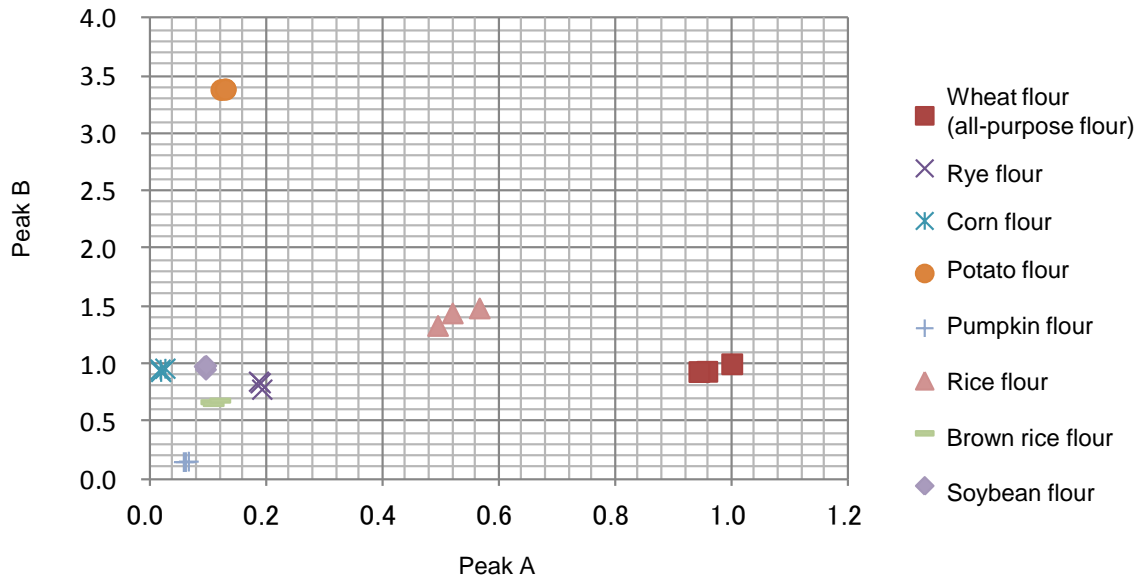


Figure 3 Estimation of Grain Flour Type Based on Intensities at 2 Wavelengths  
(Scatter Diagram of Normalized Peak Intensities)

### Trick for the measurement of a powder sample by using the microplate reader accessory

- When there is a variation in the particle size, the measurement reproducibility can be reduced. Ensure the uniformity of the particle size as much as possible.
- To reduce the measurement error between wells, ensure that the amount of the sample powder is consistent and the wells are filled to have the sample surfaces at the same height.
- Care should be taken not to disperse the powder to the adjacent wells. For example, the next sample can be filled by leaving one unfilled well in between.
- By using a soft brush, etc., ensure that the surface of the filled sample powder is smooth and even.

#### KEY WORDS

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Fluorophotometer (FL)

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