

Application Note

UV-0024

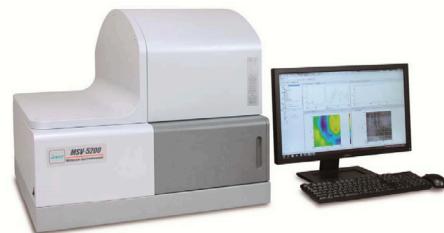


Transmission Measurement of Volvox using a MSV-5000 Series Microscopic Spectrophotometer

Introduction

The MSV-5000 series microscopic spectrophotometer is for transmission and reflection measurements in a wide wavelength range from the ultraviolet to near infrared. The built-in high resolution camera enables sample areas as small as 10 μm in diameter to be precisely measured and is therefore gaining popularity in the bioscience field for analysing localized constituents in living cells.

Volvox is a form of algae which forms localized, spherical colonies of up to 50,000 cells in the mother colony. In this application note, a daughter colony of Volvox was measured to obtain the absorption spectra and fixed-wavelength mapping.



MSV-5200
UV-Visible/NIR Microscopic
Spectrophotometer

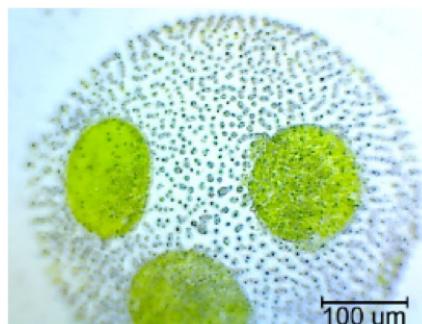


Figure 1. Dried volvox.

Keywords

MSV-5100 UV-Vis microscopic spectrophotometer, MAXY-501 Automatic XYZ stage, Biochemistry

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Experimental

Measurement Conditions			
Absorption		Fixed Wavelength Mapping	
UV-Vis Bandwidth	5 nm	Mode/Wavelength	Lattice/672 nm
Scan Speed	1000 nm/min	Bandwidth	2 nm
Response	Quick	Response	Fast
Data Interval	1 nm	Data interval	30 µm
Cassegrain Objective	16x	Cassegrain objective	16x
Aperture	50 mmΦ	Aperture	30 µmΦ

Results

The measured absorption spectrum of Volvox is shown in Figure 2 on the left. On the right the absorption spectra of chlorophyll a and b are shown, which are major components of algae¹ and therefore Volvox. The published literature data is measured under acetone solvent conditions and depending on the solvent conditions, the peak positions of chlorophylls can be shifted 2-7 nm. However, when comparing the obtained Volvox spectrum to the literature chlorophyll spectra it can be assumed that Vovlox contains both chlorophyll a and b.

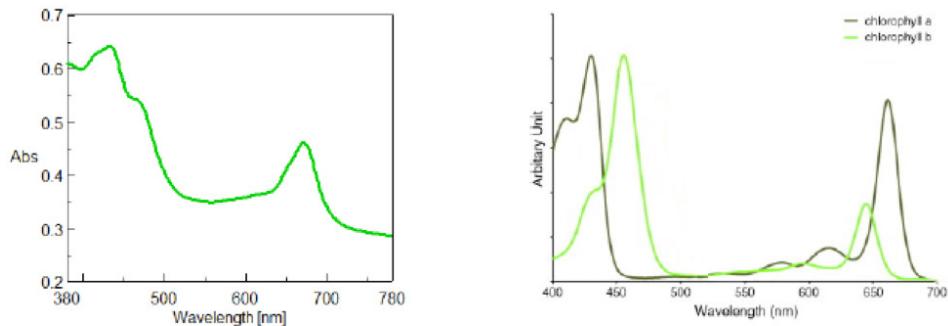


Figure 2. Absorption spectrum of Volvox (right) and chlorophyll a and b (right)¹.

Fixed wavelength mapping measurements were obtained at 672 nm, the peak observed in the absorption spectrum in Figure 2. The high speed mapping images are shown below in Figure 3. The areas with higher cellular density are easily visualized in both the sample observation image and color-coded diagram.

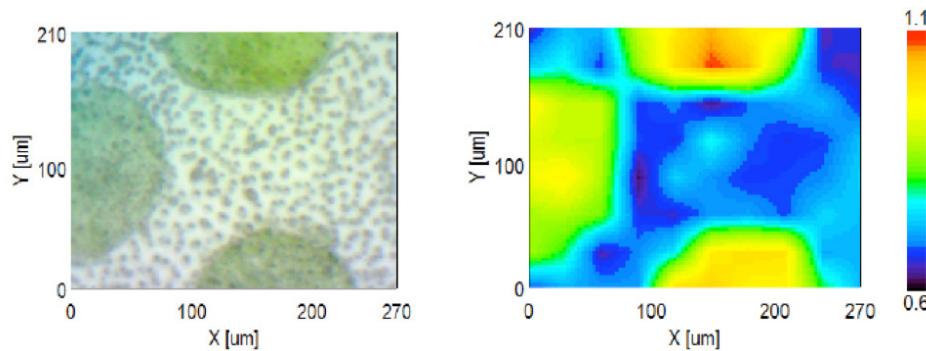


Figure 3. Observation image (left) and color-coded diagram of mapping measurement (right) of mapping.

References

1. Tanaka, Ryouichi and Ayumi Tanaka. "Chlorophyll cycle regulates the construction and destruction of the light-harvesting complexes." *Biochimica et Biophysica Acta (BBA)-Bioenergetics*, 1807, 9, 2011, 968-976.