LSCM Laser Scanning Confocal Microscopy

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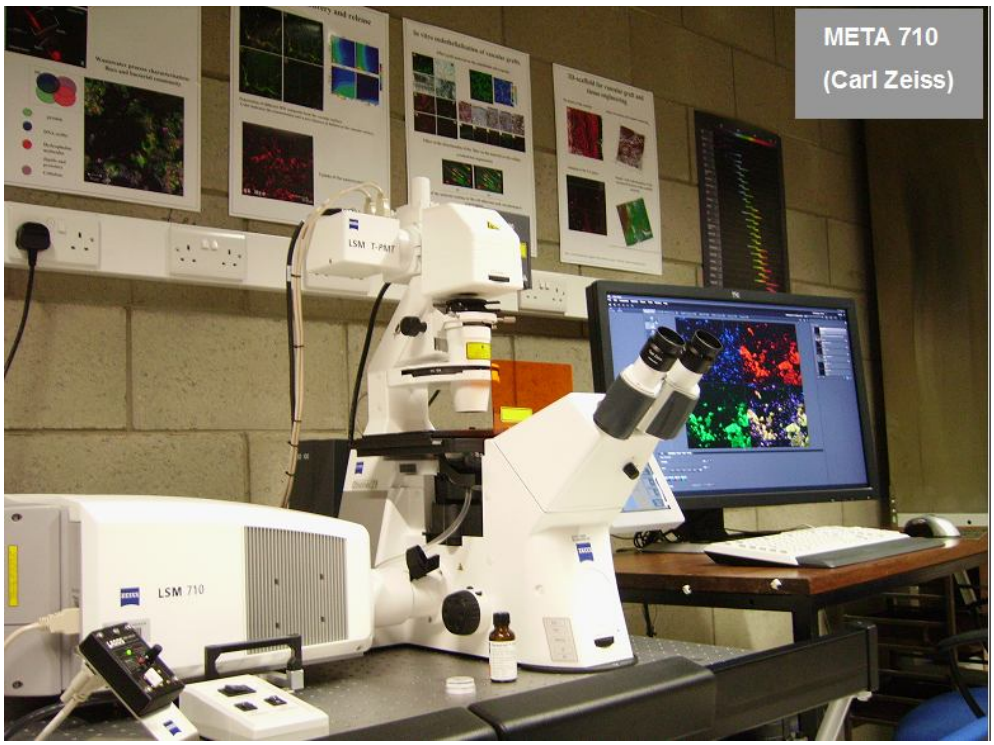
Introduction

The Zeiss LSM 710 META confocal microscopes are designed for analysis of living or fixed biological specimens in a multi-user environment.



Technical Specifications

Microscope base: AxiObserver II optical inverted microscope.

Objectives: Objective lens presented in configuration with 10x (air), 20x (air), 40x (oil), 63 x (oil).

Excitation sources: Sample excitation via a variety of laser lines (405, 458, 488, 514, 543, 633 nm) that are ideally matched to commonly used fluorophores (e.g. DAPI, acridine orange, FITC, Alexa dyes, Cy dyes, Rhodamine) and fluorescent proteins (e.g. eCFP, eGFP).

3D-imaging: Using the "Z-Stack" software module, the microscope can scan through a sample and obtain one or more high resolution optical sections. Users then have the option of utilizing a Z-Stack to render a 3D reconstruction of the sample. The microscopes can provide images of live or fixed cells and tissue sections of varying thickness.

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Time-lapse imaging: The time-lapse imaging can be used for kinetic studies of live cells with GFP, calcium indicator, FRAP applications, etc.Confocal systems utilise resonant scan heads that minimise sample illumination time and eliminate photodamage, an important requirement in longer time-lapse experiments.

Detection system: The LSM 710 is equipped with spectral detection system META 710. An advanced function of the Zeiss LSM 710 META microscope is the multi- tracking scanning capability that minimizes signal crosstalk while working with multiple fluorescences. The META detection module of the LSM 710 META enables fast acquisition of image stacks with spectral information for each pixel. With its emission fingerprinting technique, it permits the clean separation of several, even spectrally overlapping, fluorescence signals of a specimen such as the separation of GFP and YFP signals. The laser and the configuration settings are suitable for FRET. Ancillary equipment includes tissue culture hoods and incubators for specimen preparation; microtome for soft specimens.

The instrument has a temperature –controlled stage for analysis over a range of temperatures (37-55^{O} C).

Software Freeware versions of the software from Carl Zeiss can be downloaded onto individual PCs to enable image analysis independent from the instrument.

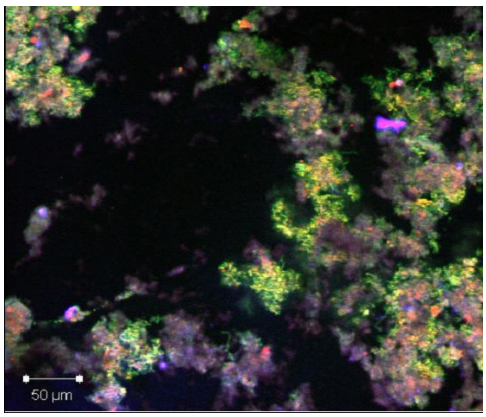

Figure 1. Structural and chemical analysis of wastewater habitat. Projection of 125 optical sections of bacterial aggregates within the sludge matrix labeled with four fluorophores.

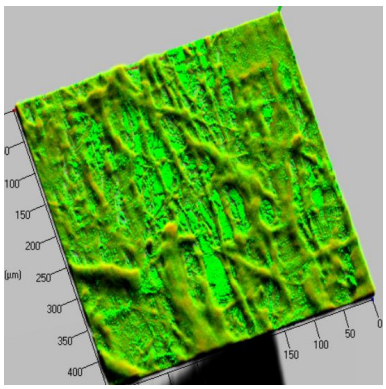

Figure 2. 3D- visualization of the structure and surface topography of a biomimetic material.

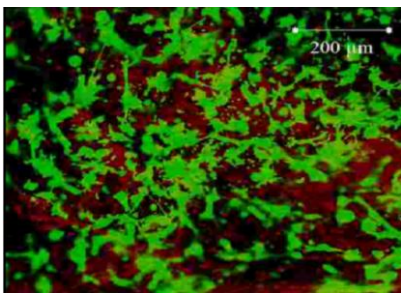

Figure 3.Multichannel imaging during adhesion and spread of human vacular cell on the surface of autofluorescent graft biomaterials (Live/Dead assay).

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