Instrumentation & Equipment

(Biological, Environmental, and Earth Sciences)

Aiken
UNIVERSITY OF SOUTH CAROLINA

Index

Olympus CKX41 Inverted Microscope with Fluorescence

Description

The Olympus CKX41 is an advanced inverted microscope designed for applications in cell biology and tissue culture. Known for its ergonomic design, it allows for brightfield and phase contrast microscopy. Additionally, it supports fluorescence imaging, making it suitable for live cell imaging, routine observation, and research in biological laboratories.

Details and Capabilities

- **Magnification range:** 10X–100X
- Fluorescence and phase contrast capability
- Infinity-corrected optics with long working distance objectives
- User-friendly design with a compact frame
- Allows for easy observation of cells at the bottom of culture flasks
- Ideal for fluorescence applications, phase contrast, and brightfield observations

Operational Use

- **Cell Culture Observation:** Frequently used to monitor cell cultures for confluency and health.
- **Fluorescence Imaging:** Utilized for imaging fluorescently labeled cells and proteins for biological research.

NuAire Biological Safety Cabinet

Description

NuAire's Biological Safety Cabinets (BSCs) provide a controlled environment that protects both the operator and the research material from contamination. They are commonly used in laboratories handling infectious agents and biohazardous materials, ensuring clean air through HEPA filtration and laminar airflow systems.

Details and Capabilities

- Class II, Type A2 cabinet with HEPA filters
- Provides personnel, product, and environmental protection
- Designed with ergonomic features for user comfort
- Energy-efficient airflow systems
- Available in various sizes, ranging from 3 to 6 feet wide
- UV sterilization lamps for decontamination

Operational Use

- **Biosafety:** Used in research labs for handling pathogenic samples in fields like microbiology and virology.
- **Sterile Environment:** Ensures aseptic conditions when working with sensitive biological materials.

Olympus BX41 Fluorescent Conformed Microscope

Description

The Olympus BX41 is a high-performance upright microscope that offers superior optical clarity for a range of biological applications. It includes fluorescence capabilities, making it ideal for observing and analyzing fluorescence-labeled specimens such as cells and tissues.

Details and Capabilities

- Fluorescence and brightfield imaging
- Compatible with a wide range of objectives, including phase contrast and DIC
- **Magnification range:** 4X–100X
- LED and halogen illumination options for fluorescence excitation
- High-sensitivity filters for improved fluorescence detection

Operational Use

- **Fluorescence Microscopy:** Used to visualize fluorophore-labeled proteins, DNA, and RNA in various biological samples.
- **Brightfield Observation:** Also supports routine brightfield microscopy for clinical and research use.

Leica DMi8 Confocal Microscope

Description

The Leica DMi8 is a state-of-the-art inverted confocal microscope known for its precision in imaging complex biological specimens. It is widely used in cell biology, developmental biology, and neurobiology for its ability to provide high-resolution, 3D images of fluorescently labeled specimens.

Details and Capabilities

- Equipped with a confocal laser scanning system
- **Magnification range:** 10X–100X
- Fully motorized stage for multi-dimensional imaging
- Supports fluorescence, phase contrast, and DIC imaging
- High-resolution 3D imaging capabilities for thick samples
- Wide range of compatible objective lenses

Operational Use

- **3D Imaging:** Ideal for generating high-resolution 3D reconstructions of biological samples.
- **Live Cell Imaging:** Supports time-lapse studies of live cells under physiological conditions.

Steris SG116 Scientific Gravity Sterilizer

Description

The Steris SG116 is a high-capacity scientific gravity sterilizer designed for the decontamination of medical and laboratory equipment. Its advanced gravity-displacement process ensures thorough sterilization, making it suitable for research labs, pharmaceutical production, and clinical settings.

Details and Capabilities

- **Chamber Size:** 16 cubic feet
- Gravity displacement steam sterilizer
- Automatic sterilization cycles with temperature control up to 135°C
- Equipped with a microprocessor control system for programmable cycles
- Stainless steel interior for durability

Operational Use

- **Sterilization:** Used for sterilizing surgical instruments, lab glassware, and other materials.
- **Decontamination:** Essential in biosafety labs for the decontamination of biohazardous waste.

BioRad CFX Connect Real-Time System

Description

The BioRad CFX Connect Real-Time System is a precise and user-friendly qPCR platform designed for fast and sensitive detection of nucleic acids. It offers high throughput with its 96-well format, and its Peltier-based thermal cycler ensures consistent and accurate thermal control, making it suitable for various research applications.

Details and Capabilities

- **Capacity:** 96-well reaction block
- **Temperature Range:** 0°C to 100°C
- **Fluorescence detection channels:** 2 (SYBR Green, FAM, HEX, ROX, etc.)
- **Detection speed:** Fast data acquisition with multiple targets simultaneously
- **Software:** CFX Maestro for real-time data analysis

Operational Use

- **Nucleic Acid Quantification:** Used for real-time quantification of DNA and RNA samples.
- **Gene Expression:** Ideal for analyzing gene expression changes in different conditions.
- **High-throughput Analysis:** Supports rapid screening of large sample numbers.

BioRad CFX Dual Real-Time System

Description

The BioRad CFX Dual Real-Time System is an advanced qPCR platform capable of multiplexing for detecting multiple targets simultaneously. It is suitable for high-precision experiments requiring low detection limits and reliable data for various genetic applications.

Details and Capabilities

- **Capacity:** 96-well block
- **Temperature Range:** 0°C to 100°C
- **Multiplexing:** Detects up to two fluorophores simultaneously
- **Optical System:** Patented scanning optics to minimize cross-talk between channels
- **Applications:** Multiplex assays, SNP genotyping, gene expression analysis

Operational Use

- **Multiplex PCR:** Simultaneous detection of multiple genetic markers in a single reaction.
- **Pathogen Detection:** Suitable for diagnostic labs conducting pathogen detection assays.
- **Mutation Screening:** Detects single nucleotide polymorphisms (SNPs) with high accuracy.

BioRad CFX 96
Real-Time System

Description

The BioRad CFX 96 Real-Time System is designed for high-throughput qPCR applications. Its 96-well format and multiplexing capabilities allow researchers to perform up to five-target analysis in one run, enhancing lab productivity and experimental efficiency.

Details and Capabilities

- **Capacity:** 96-well block
- **Fluorescence Detection:** 5-channel detection system
- **Temperature Control:** Peltier-based with fast ramping speeds (5°C/sec)
- **Multiplexing:** Detects multiple targets in one well
- **Software:** Integrated with CFX Manager software for in-depth data analysis

Operational Use

- **High-throughput Experiments:** Ideal for large-scale gene expression and mutation studies.
- **Multiplex Assays:** Enables detection of multiple genes or targets in one experiment.
- **Diagnostic Applications:** Useful in pathogen detection and clinical research.

BioRad ChemiDoc XRST System

Description

The BioRad ChemiDoc XRST System is a high-performance imaging system used for documenting and analyzing chemiluminescent, fluorescent, and colorimetric gels. It offers sensitive detection with high dynamic range, making it suitable for various molecular biology techniques.

Details and Capabilities

- **Imaging Capabilities:** Chemiluminescence, fluorescence, colorimetry
- **Detection Range:** Wide dynamic range with low noise for sensitive detection
- **Applications:** Western blotting, DNA/RNA gel electrophoresis
- **Software:** Image Lab for image capture, quantification, and analysis

Operational Use

- **Protein and DNA Imaging:** Used for visualizing and documenting gels stained with fluorescent or chemiluminescent markers.
- **Western Blot Analysis:** Commonly used in immunodetection to visualize proteins in blot assays.
- **Quantitative Analysis:** Provides accurate data for quantifying band intensities.

Leica 165 FC Inverted Microscope with Fluorescence

Description

The Leica 165 FC is a high-resolution stereomicroscope equipped with fluorescence capabilities, optimized for imaging live and fixed biological samples. Its broad magnification range and precision optics make it suitable for research applications like developmental biology, genetics, and neuroscience.

Details and Capabilities

- **Magnification:** 7.3x – 120x zoom range
- **Fluorescence Detection:** Supports various fluorophores, including GFP, DAPI, and Texas Red
- **Imaging:** High-contrast optics for brightfield and fluorescence imaging
- **Modular Design:** Can be expanded with additional components for specific research needs

Operational Use

- **Live Cell Imaging:** Ideal for observing and documenting live samples under fluorescence.
- **Fluorescence Applications:** Used in studies requiring the visualization of specific protein markers in cells.
- **High-Resolution Imaging:** Suitable for capturing detailed images in embryology and cellular research.

Leica DMi 8
Confocal Microscope

Description

The Leica DMi 8 is a high-performance confocal microscope designed for advanced imaging applications. It provides unparalleled resolution and contrast for live cell imaging and offers a range of customizable options to meet diverse research needs. Its modular design supports various imaging modalities, making it ideal for both basic and applied research in biological sciences.

Details and Capabilities

- **Imaging Modes:** Confocal, widefield, and fluorescence imaging capabilities
- **Resolution:** Up to 200 nm lateral resolution with super-resolution options
- **Laser Configuration:** Multiple laser lines available for a broad range of fluorophores
- **Software:** User-friendly interface with advanced imaging software for data analysis and visualization

Operational Use

- **Live Cell Imaging:** Perfect for tracking dynamic processes in live specimens.
- **Multicolor Experiments:** Enables simultaneous imaging of multiple fluorescent markers.
- **High-Content Screening:** Suitable for high-throughput applications in drug discovery and cellular biology.

So-Low -80°C Freezers

Description

The So-Low -80°C Freezers are designed for long-term storage of biological samples, providing an ultra-low temperature environment to preserve sample integrity and viability. They are essential in laboratories requiring reliable storage solutions for sensitive materials.

Details and Capabilities

- **Temperature Range:** Maintains temperatures down to -80°C
- **Capacity:** Various sizes available to accommodate different sample volumes
- **Control System:** Digital temperature control and monitoring for precise temperature regulation
- **Insulation:** High-efficiency insulation for energy savings and stable temperatures

Operational Use

- **Sample Preservation:** Ideal for long-term storage of DNA, RNA, and proteins.
- **Cryopreservation:** Supports the storage of biological samples for future research and experimentation.
- **Laboratory Backup:** Functions as a critical backup solution in case of equipment failure.

Leica CM1850 Cryostat

Description

The Leica CM1850 is a high-performance cryostat designed for sectioning frozen biological samples. It offers precise temperature control and a range of features to facilitate the preparation of high-quality tissue sections.

Details and Capabilities

- **Temperature Range:** Adjustable temperature settings from -35°C to -10°C
- **Cutting Thickness:** Capable of sectioning from 1 µm to 100 µm
- **Blade System:** Uses disposable blades for consistent and sharp cuts
- **Ergonomics:** User-friendly design with adjustable height and easy access controls

Operational Use

- **Tissue Sectioning:** Ideal for preparing samples for histological analysis.
- **Frozen Specimens:** Suitable for both fresh and fixed frozen tissues.
- **Cryosectioning Applications:** Used in cancer research, developmental biology, and pathology.

Molecular Devices Spectramax Luminometer

Description

The Molecular Devices Spectramax Luminometer is a versatile detection platform for measuring luminescent signals in various biological assays. It is optimized for high sensitivity and rapid analysis.

Details and Capabilities

- **Detection Modes:** Supports luminescence, fluorescence, and absorbance measurements
- **Dynamic Range:** High sensitivity for detecting low-abundance targets
- **Software:** Includes powerful analysis software for data acquisition and processing
- **Format Compatibility:** Works with a variety of plate formats, including 96-well and 384-well plates

Operational Use

- **High-Throughput Screening:** Suitable for screening compounds in drug discovery.
- **Bioluminescent Assays:** Used in gene expression and reporter assays.
- **Cell Viability Testing:** Assists in evaluating cell health and response to treatments.

Molecular Devices Spectramax ABS

Description

The Molecular Devices Spectramax ABS is an advanced absorbance reader designed for precise optical density measurements in a variety of sample types. It is widely used in microbiology, biochemistry, and molecular biology laboratories.

Details and Capabilities

- **Wavelength Range:** Covers a broad spectrum from UV to visible light (190 nm to 1000 nm)
- **Plate Formats:** Compatible with multiple plate formats for flexible application use
- **Data Acquisition:** Fast and reliable readings with built-in data analysis tools
- **Optical System:** High-performance optical design for accurate measurements

Operational Use

- **OD Measurements:** Ideal for measuring cell growth and concentration in culture.
- **Enzyme Kinetics:** Used in enzyme assays to track reaction rates.
- **Nucleic Acid Quantification:** Assists in quantifying DNA and RNA concentrations in samples.

GE 5310C ToC Analyzer

Description

The GE 5310C Total Organic Carbon (ToC) Analyzer is designed for accurate measurement of organic carbon levels in various water and wastewater samples. Its advanced technology provides reliable results for environmental monitoring and compliance testing.

Details and Capabilities

- **Measurement Range:** Capable of detecting ToC levels from low ppb to high ppm
- **Analysis Time:** Rapid analysis with results in as little as 5 minutes
- **Sample Types:** Suitable for a wide range of water samples, including drinking water, wastewater, and industrial effluents
- **Automation:** Includes automated sample handling for high-throughput analysis

Operational Use

- **Environmental Monitoring:** Essential for assessing water quality and compliance with environmental regulations.
- **Process Control:** Used in industrial applications to monitor treatment processes.
- **Research Applications:** Supports studies in aquatic science and pollution analysis.

MineARC Systems Biona Environmental Chamber

Description

The MineARC Systems Biona Environmental Chamber is designed for controlled environmental conditions, ensuring optimal settings for various biological and chemical applications. It provides a stable environment for research, testing, and development.

Details and Capabilities

- **Temperature Control:** Adjustable temperature settings from 0°C to 60°C
- **Humidity Control:** Maintains humidity levels between 20% to 90% RH
- **Interior Dimensions:** Available in various sizes to accommodate different experimental needs
- **Monitoring Systems:** Integrated systems for real-time monitoring and data logging

Operational Use

- **Biological Studies:** Ideal for microbiological and botanical research.
- **Material Testing:** Used for testing material stability under controlled conditions.
- **Pharmaceutical Applications:** Supports drug stability studies and quality control testing.

Environmental Specialties Environmental Chamber

Description

The Environmental Specialties Environmental Chamber provides precise control over temperature, humidity, and other environmental factors, making it suitable for a variety of research and testing applications.

Details and Capabilities

- **Temperature Range:** Typically, adjustable from -20°C to +60°C
- **Humidity Control:** Maintains a relative humidity range of 10% to 95%
- **Custom Configurations:** Available in various sizes and configurations to meet specific research requirements
- **Data Logging:** Equipped with advanced monitoring systems for data acquisition

Operational Use

- **Environmental Testing:** Ideal for testing the effects of climate on products and materials.
- **Controlled Experiments:** Supports biological, chemical, and material research under specific conditions.
- **Quality Assurance:** Used in industries requiring stringent environmental controls, such as pharmaceuticals and electronics.

Biotronette Environmental Chamber

Description

The Biotronette Environmental Chamber is a compact chamber designed for simulating specific environmental conditions for biological studies. Its precise controls make it ideal for research involving living organisms.

Details and Capabilities

- **Temperature Control:** Adjustable range typically from -10°C to +50°C
- **Humidity Control:** Maintains humidity levels with high precision
- **Lighting Options:** Often includes adjustable lighting for plant growth studies
- **User-Friendly Interface:** Simple controls for easy operation and monitoring

Operational Use

- **Plant Growth Studies:** Suitable for experiments requiring specific light and temperature conditions.
- **Microbial Research:** Used in studies involving bacteria and fungi under controlled conditions.
- **Educational Applications:** Commonly used in academic settings for teaching purposes.

Sakura Tissue-Tek VIP 5A-B1 Histology Processor

Description

The Sakura Tissue-Tek VIP 5A-B1 is a fully automated histology processor designed for high-throughput processing of tissue samples. It ensures consistent results and efficiency in tissue preparation.

Details and Capabilities

- **Processing Cycles:** Multiple processing protocols available to accommodate various tissue types
- **Automation:** Fully automated system with programmable settings for user convenience
- **Capacity:** Can process multiple samples simultaneously, increasing throughput
- **Quality Control:** Integrated features to ensure optimal processing conditions

Operational Use

- **Histology Applications:** Essential for preparing tissue samples for microscopic analysis.
- **Research and Diagnostics:** Supports clinical research and diagnostic labs in histopathology.
- **Standardized Procedures:** Ensures consistency and quality in tissue processing across samples.

Canberra Gamma Counter

Description

The Canberra Gamma Counter is a sophisticated instrument designed for the detection and measurement of gamma radiation in various samples. It is widely used in nuclear medicine, environmental monitoring, and research applications.

Details and Capabilities

- **Detection Efficiency:** High sensitivity for low-level gamma radiation
- **Sample Types:** Suitable for a variety of sample formats, including liquids, solids, and biological samples
- **Data Analysis:** Advanced software for data acquisition, analysis, and reporting
- **Calibration:** User-friendly calibration procedures for accurate measurements

Operational Use

- **Radiological Safety:** Used in laboratories to monitor radioactive materials and ensure safety.
- **Environmental Studies:** Essential for assessing environmental contamination and tracking radioisotopes.
- **Research Applications:** Supports studies in health physics and radiobiology.