



Quantum Design  
International

# Product Guide



*Your Source for Scientific Instrumentation*

BIOTECHNOLOGY

CRYOGENICS

LITHOGRAPHY

MATERIALS CHARACTERIZATION

SAMPLE SYNTHESIS

*In the fast evolving world of scientific research it is important to have access to the latest and most advanced instrumentation. One look through this product guide will give you an insight into some of the most sophisticated instruments available in the market today. In addition to providing world class scientific instruments that will further your research, Quantum Design takes pride in offering global sales, service and technical support.*

### Quantum Design International

Since its inception in 1982, Quantum Design International (QDI) has developed and manufactured automated temperature and magnetic field testing platforms for materials characterization. These systems offer a variety of measurement capabilities and are in widespread use in the fields of physics, chemistry, biotechnology, materials science and nanotechnology.

Building on its expertise in the global marketing and distribution of its own scientific instruments, QDI eventually broadened its scope to distribute quality scientific instruments from other manufacturers through an international network of wholly owned subsidiaries in every major technological center around the world.

With offices in the USA, Japan, China, India, Korea, Taiwan, Singapore and Brazil, as well as thirteen European countries, QDI is strategically located in the world's key centers for scientific research, providing local marketing, sales and technical support.



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## nB nanoScale Biomagnetics: DM100 Series for Magnetic Hyperthermia

nB nanoScale Biomagnetics introduces the DM100 Series, the integral, immediate and reliable solution for laboratory tests on magnetic hyperthermia. The instrumentation is available in 3 configurations

**DM1** is the only device on the market specially designed for an accurate determination of the physical parameters (SAR) that describe the heating effects of alternating magnetic fields on magnetic nanosystems.

**DM2** is the most versatile tool you can imagine for studying the heating effects of alternating magnetic fields on magnetic nanosystems on in vitro, in vivo or new material test

**DM3** is the only device on the market specially designed for an accurate application of alternating magnetic field, local sensing and experiment monitoring in mice and rats on laboratory hyperthermia procedures. This is ideally suited for drug delivery therapies.



## Aresis: TWEEZ Turn-Key Laser Tweezer Technology

Tweez is a complete turn-key laser tweezers system. Designed to fit Nikon Eclipse TE2000/Ti-E microscopes, it combines powerful laser tweezing manipulation capabilities with microscopy techniques delivered by the microscope. Tweez is designed for zero maintenance and to let you focus on your application. Based on acousto-optic (AO) laser beam deflection technology, Tweez enables you to create complex trapping patterns. Manipulation of trapped objects is possible through flexible control of trapping sites with unprecedented positional and time accuracy. Tweez AO laser beam steering is the only technology capable of sub-nanometer optical trap positioning and trap-to-trap switching rates of up to 100 kHz.

Designed to serve a variety of applications, Tweez finds its use ranging from physics to biology, from fundamental research to industrial applications. The precision and ease-of-use let you maintain the focus on your project.



## Quantum Design: Advanced Technology Liquefiers (ATL) and Helium Recovery Systems

Quantum Design's Advanced Technology Liquefiers (ATL) along with its innovative Helium Recovery, Storage & Purification Systems allow you to recover and liquefy the helium gas currently being lost from the normal boil off and helium transfers of your cryogenic instruments. Quantum Design's Advanced Technology Liquefiers were developed for general users, with friendly, touch-screen user interfaces and remote access available over the internet. Unlike other industrial liquefiers, the ATL's small, portable size is doorway and ramp friendly.

### Advanced Technology Liquefiers Provide:

- Easy-to-Use, Fully Automated Operation for Liquefaction from 12 to 27 liters/day
- Portable Liquefiers for Easy Transfers
- High Liquefaction Rates and Energy Efficiency
- Self-Cleaning, Uninterrupted Service
- Modular Design: Your System Can Grow as Your Helium Needs Evolve

**ATL80:** 12 - 18 liters/day (0.50 - 0.75 liters/hr)\*; 80 liter capacity; Air-Cooled Compressor

**ATL160:** 22 - 27 liters/day\*; 160 liter capacity; Split Air-Cooled or Water-Cooled Compressors Available

**ATL160+:** 30+ liters/day\*; Perfect for labs needing frequent transfers

*\* Liquefaction rates vary based on transfer frequency, input helium quality and pressure.*

### Advantages of Quantum Design's ATP30 Helium Purifier

- Purifies 30 liters of helium gas per minute\*
- Purifies helium gas to 99.9995% (better than UHP)
- Fail Safe Operation – Stops operation before "dirty" gas passes through system
- Full regeneration of system is automated and only takes 5 hours (with no filters or cartridges to replace)\*
- Virtually eliminates contamination causing blocked impedences

*\* Purifier operation varies based on input helium quality.*

Quantum Design's ATL Helium Recovery Systems can be configured for laboratories and scanning rooms large and small, and for any number of cryogenic instruments. Recovery systems can be used with a wide range of cryogenic instruments including MRI, MEG, NMR and other assorted cryostats.



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## Durham Magneto Optics: MicroWriter ML

**MicroWriter ML** is a set of flexible photolithography machines designed for rapid prototyping and small volume manufacturing in R&D laboratories and small clean rooms. It is a new design of direct-write laser lithography machine which combines the flexibility of maskless direct writing with high speed and low cost.

### Key Features:

- 1 mm – 200 mm sample size
- 1  $\mu\text{m}$  resolution in standard system; 0.6  $\mu\text{m}$  resolution available as an option
- Up to 180  $\text{mm}^2$ /minute writing speed
- 405 nm exposure wavelength suitable for G- and H-line and broadband photoresists; 375 nm available as an option
- Wide field of view optical microscope and high resolution scanning laser microscope for alignment of exposure to existing structures
- Infra-red microscope for double sided wafer alignment available as an option
- 'Turbo' exposure mode in which fifteen 8  $\mu\text{m}$  resolution lasers work in parallel to expose large areas at high speed
- Realistically priced for University and industrial R&D budgets



## SwissLitho: 3D Thermal Scanning Probe Lithography

**NanoFrazor** is a unique tool for rapid-prototyping of nanostructures and nanodevices. The patterning principle of the NanoFrazor technology is based on thermal Scanning Probe Lithography (tSPL).

NanoFrazor uses a hot probe tip to locally heat an organic resist which instantly decomposes into volatile units. The volatile units evaporate and leave a void of nanometer dimensions. By placing such voids adjacent to one another, arbitrary shapes can be carved out from the resist. It has been developed for researchers who want to have easy and quick access to high-resolution nanometer sized geometries. Even 3D nanopatterns can be fabricated in a single step and with unmatched precision. The closed-loop lithography (CLL) concept of the technology makes the patterning procedure extremely robust. The simultaneous inspection of the written nanostructures allows immediate quality control and feedback.



## Quantum Design: Physical Properties Measurement Systems (PPMS®)

The Quantum Design Physical Property Measurement System (PPMS) represents a unique concept in laboratory equipment: an open architecture, variable temperature-field system, designed to perform a variety of automated measurements. Use the PPMS with our specially-designed measurement options, or easily adapt it to your own experiments. Sample environment controls include fields up to  $\pm 16$  tesla and a temperature range of 1.8 K – 400 K.

### Cryogen-free PPMS Options:

The PPMS from Quantum Design is now available in a truly cryogen-free package. The **PPMS DynaCool™**, Quantum Design's latest development effort, uses a single two-stage Pulse Tube cooler to cool both the superconducting magnet and the temperature control system, providing a low vibration environment for sample measurements. In addition, the cryogen-free **PPMS EverCool® II** option is an available upgrade for existing wet PPMS systems.

### VersaLab™: 3 Tesla, Cryogen-free Physical Property Measurement System

The PPMS VersaLab is a portable, cryogen-free cryocooler-based material characterization platform. With a temperature range of 50 K – 400 K, this 3 tesla platform is perfect for accomplishing many types of materials characterization in a limited space, with no requirements for cryogenic liquids or high power infrastructure.

**PPMS Measurement Options include:** DC Resistivity, Electrical Transport, Sample Rotator, Multi-Function Probe, VSM, Torque Magnetometry, AC Susceptibility, Magneto-Optic FOSH, Thermal Transport, Heat Capacity, High Pressure Measurements, FMR, and Ultra Low Temperature measurements down to 50 mK.

## NanOsc Instruments: FMR Spectrometers

**PhaseFMR:** The PhaseFMR spectrometer is a plug and play system that allows broadband CPW-FMR characterization with lock-in capability. It includes its own RF frequency source as well as lock-in detection module, so that the only parts required to conduct an experiment are a computer for software control and an electromagnet with a power supply. This makes PhaseFMR easy to integrate with any experimental setup. Room-temperature FMR available in two versions: 2 to 17 GHz and 2 to 40 GHz.

**CryoFMR:** A Cryo FMR version is available for use with the Montana Instruments Cryostation or Quantum Design PPMS systems. Temperature range: 4 K to 300 K. Frequency Range 2 to 17 GHz.



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NanOsc  
Instruments



## Quantum Design: Magnetic Properties Measurement Systems (MPMS®)

### Magnetic Property Measurement System (MPMS®3)

Quantum Design's MPMS 3 represents the culmination of more than 30 years of development and design in the world of SQUID Magnetometry. The MPMS 3 incorporates major advances in data acquisition, temperature control and magnetic field control with  $\leq 10^{-8}$  emu sensitivity. Offering a choice of multiple measurement modes (including traditional MPMS DC Scan) the MPMS 3 provides expanded software functionality within its user-friendly MultiVu interface. Combining the highest level of system performance with the possibility of using all previously available MPMS measurement options, the Quantum Design MPMS 3 truly represents the next generation of advanced SQUID magnetometry.

- SQUID AC Susceptibility Measurement: 0.1 Hz to 1 KHz; Sensitivity:  $5 \times 10^{-8}$  emu at 0 T
- Ultra-Low Field Capability:  $\pm 0.05$  G with a 7 T magnet
- VSM with Oven up to 1000 K
- Magneto-Optic Measurement (FOSH, Light Source)
- Horizontal Rotator & High Pressure Cell for Magnetometry



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## Durham Magneto Optics NanoMOKE3:

### An ultra-high sensitivity Kerr Effect Magnetometer

**NanoMOKE3** is a new generation turnkey ultra-high sensitivity magneto-optical magnetometer and Kerr microscope. The system offers high performance laser magnetometry and near video-rate Kerr microscopy in a single machine. It is sensitive to longitudinal, transverse and polar magneto-optical Kerr effects and is ideally suited to measuring the magnetic properties of thin magnetic films and magnetic nanostructures. An optional liquid helium cooled or cryogen free sample stage allows measurements to be made in temperature ranges of 4.2 K – 300 K.





## Attocube: Scanning Probe Microscopes (MFM, AFM, SHPM, CFM) for the PPMS®

attocube Systems creates products perfectly tailored to the requirements of today's challenges in the nanotechnology world. attocube Systems' PPMS SPM inserts are the only Scanning Probe Microscopes certified and endorsed by Quantum Design for use in its respected Physical Property Measurement System (PPMS). The ultra-compact, high resolution PPMS SPM uses advanced technologies such as low temperature compatible objectives for confocal microscopy or a fiber-optical interferometer for force microscopy with outstanding signal-to-noise force detection.

- **Low Temperature Magnetic Force Microscope (attoMFM Ixs):** On the basis of a conventional atomic force microscope, the instrument works by scanning a sample below a fixed magnetic cantilever.
- **Low Temperature Atomic Force Microscope (attoAFM Ixs):** The instrument works by scanning a sample below a fixed cantilever while measuring its deflection with the highest precision using a fiber based optical interferometer.
- **Low Temperature Scanning Hall Microscope (attoSHPM xs):** At the heart of the SHPM, a molecular beam epitaxy (MBE) grown GaAs/AlGaAs Hall sensor measures magnetic fields with unrivaled sensitivity.
- **Low Temperature Confocal Microscope (attoCFM xs):** Ultra-compact confocal microscope developed to offer the highest flexibility combined with maximum mechanical stability for low temperature confocal microscopy experiments. Can be ordered with either free-beam or fiber based optics.

## Single Quantum: Superconducting Nanowire Single Photon Detector (SNSPD)

Single Quantum's **Eos X10 CS** is a superconducting nanowire single photon detector (SNSPD) with unparalleled detection efficiency in the near infrared spectrum. The Eos X10 CS has low timing jitter, low dark counts, robust fiber coupling and is capable of broadband photon detection. Its easy-to-use "plug and play" interface is closed-cycle and consumes no helium.

Current applications for the Eos X10 CS include (but are not limited to): photon correlation measurements; quantum dot spectroscopy; quantum computing; quantum key distribution and quantum cryptography; single molecule fluorescence spectroscopy; CMOS defect analysis; laser remote sensing; and single oxygen luminescence.



## Quantum Design: Floating Zone IR Image Furnace

The high-performance, compact IR Image Furnace offers unsurpassed performance in a convenient, stand-alone design. It uses the Floating Zone (FZ) method to promote single crystal growth from a polycrystalline rod. The system is available in 2 or 4 mirror configurations.

### Benefits of QD IR Furnace:

- 2100° C in Floating Zone Region
- Excellent IR power stability
- No external cooling required
- Single phase power
- Maximum Pressure: 10 Bar
- Crystal growth monitoring with CCD camera
- Vacuum pumping port available

### The Quantum Design IR Image Furnace is Capable of Growing:

High Temperature Superconductors, Dielectrics and Magnetic Materials, Intermetallics, Metal Compounds, Semiconductors, Optical Crystals, and Precious Stones.



## GES: Tetra Arc Furnace

Manufactured by GES Corporation, this tetra arc crystal furnace uses the Czochralski pulling method and four electric arcs to grow a wide range of metallic-conductive materials such as metallic compounds and high-temperature superconductors.

### Features of the GES Tetra Arc Furnace:

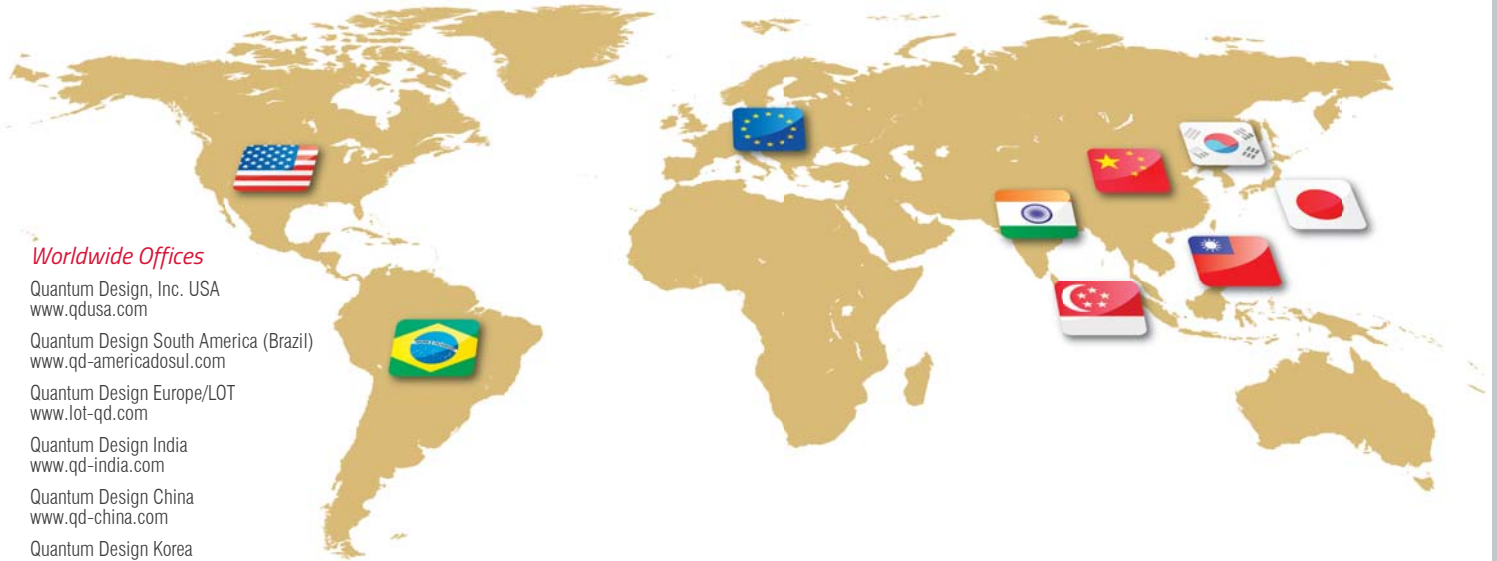
- Single crystal growth by Czochralski pulling method
- Four electric arcs to uniformly melt materials up to 3000° C
- Vacuum system that reaches  $10^{-6}$  Torr vacuum in one hour
- Easy operation of all growth parameters
- Convenient handling of materials
- Four monitoring windows
- CCD camera for real-time monitoring of growth process

Ideal for growing: Metal compounds & High-temperature superconductors.



## *Quantum Design – Your Technology Partner*

Using its 30+ years of experience in the manufacture and distribution of scientific measurement instruments, Quantum Design knows what researchers need to succeed. We offer guaranteed reliability, local technical support and expertise, and working knowledge across a range of research applications and technologies.



### *Worldwide Offices*

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### *We're there, Where You Are – Global, Local Sales and Service Support*

With offices and representatives located in technology centers around the world, Quantum Design is able to offer an international network of local offices ready to assist you with sales and service support.



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Specifications subject to change without notice

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