Cell & Tissue Culture Labware
No Compromises – Just Ideal Solutions
Greiner Bio-One – Your Leading Partner in Cell Biology and Tissue Culture

### Research & Development
- Team of competent and experienced biologists, physicists, chemists and engineers
- Constant development of new products for cell and tissue culture
- Research and application laboratories
- In-house construction facility supporting 3D CAD and mouldflow simulation
- Cooperation with leading universities, research institutions and technology partners
- Custom solutions – OEM services from branding to product development

### Technology
- Injection moulding and extrusion-blow moulding
- Physical and chemical surface modifications
- Aseptic coating with biologically active proteins
  - Collagen
  - Poly-D-/L-Lysine
  - Fibronectin
  - Laminin
  - Streptavidin
- Fabrication of material composites
  - Plastic-foil
  - Plastic-filter
  - Plastic-glass
- Ultrasonic fusion and laser welding
- Pad, silkscreen and ink-jet printing, laser marking of products
- Micro and nano structuring

### Production
- Modern, fully automated manufacturing
- Highly skilled employees with excellent professional qualifications
- Controlled production environment (seed number, particle number, air pressure, temperature, humidity)
- Clean-room with laminar airflow
- Production facilities in Germany, Austria, Hungary, Brazil, Thailand and USA
- Continuous investment at the production facilities
Quality Standards

- Certification according to DIN EN ISO 9001 and EN ISO 13485
- In-house QC laboratories
- Regular monitoring of product performance in cell culture
- Products free of detectable DNase, RNase, human DNA and endotoxins
- Validated sterilisation process
- Raw material testing and traceability from raw material to final product
- International product certifications (e.g. CE-label for IVD and medical products)

Experience & Tradition

- More than 50 years of experience in the manufacturing of laboratory equipment
- Organically grown global network of material suppliers, technology and science partners (e.g. Boehringer Ingelheim Pharma GmbH & Co. KG, Genomics Institute of the Novartis Research Foundation (GNF), Essex Pharma GmbH, Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB)
- Involvement in fundamental innovations in cell biology and cell culture

Sales & Distribution

- Global distributor and service network
- Worldwide warehousing network and logistical partners in more than 100 countries
- Global fast and save shipment
- Technical support provided through international sales team, service hotline and website
- Online product catalogue and EDI for improved purchasing

Greiner Bio-One – Your Leading Partner in Cell Biology and Tissue Culture
Success Depends on the Right Equipment

Cell and Tissue Culture
- CELLSTAR® dishes, plates and flasks, EASYstrainer™
- liquid handling

Cell and Antibody Production
- Multiwell plates, ELISA plates

Assay and HTS Performance
- AutoFlask™

Molecular Biology
- Reaction tubes, PCR tubes and plates

Microscopy and Imaging
- CELLview™, SensoPlate™, SCREENSTAR

Assay and HTS Performance
- Multiwell plates, ELISA plates

Cell Separation
- Leucosep™, OncoQuick®

Molecular Biology
- Reaction tubes, PCR tubes and plates

Automated Cell Culture
- AutoFlask™

Cell and Sample Storage
- Cryo.s™ and Cryo.s™ with Datamatrix for Biobanking

Quality Control and Mycoplasma Detection
- CytoInspect™

Cell and Tissue Culture
- CELLSTAR® dishes, plates and flasks, EASYstrainer™
- liquid handling

Cultivation of Sensitive Cells and Stem Cells
- Cell-Repellent Surface Advanced TC™, CELLCOAT®,

3D Cell Culture and Tissue Engineering
- ThinCert™ cell culture inserts and plates, Cell-Repellent Surface, Nano3D

Application reports on cell culture products can be found in the Download Center on our website: www.gbo.com
During its 50-year tradition in the development and manufacture of products for cell biology and tissue culture, Greiner Bio-One not only witnessed, but also took an active part in the evolution of biotechnology as one of the leading technologies of our century. These years were attended by ingenious ideas, such as the introduction of the first disposable labware in 1963, the first 96-well plate with round bottom wells in 1966 and the market launch of the first miniaturised 1536 well screening plate in 1997. Today, Greiner Bio-One faces up to the future with technologically advanced, high-value solutions for biological, pharmaceutical and medical research.

**CELLSTAR® – a Story of Unbreakable Success**

**The CELLSTAR® Product Line**

Classical applications in cell biology such as the cultivation and manipulation of immortalised cells in adherent and suspension culture became standard practice in laboratories around the world.

With its product line CELLSTAR®, Greiner Bio-One offers the ultimate solution for these classical and standard cell culture techniques. A broad spectrum of formats covers the entire range of applications in cell biology including the propagation of cells, the performance of cell-based assays and elementary imaging procedures.

The CELLSTAR® CELLreactor™ can be used as a small bioreactor for the shaken culture of suspension cells. By the combination of tube design with filter cap, excellent gas exchange at maximal sterility is offered in a format that easily allows to maximise the number of parallel experiments. Based on the conical design the tubes fit in standard 15 mL / 50 mL centrifuge rotors and cells can be spun down in the same tube they have been cultivated in.

The secrets of the ongoing success of the CELLSTAR® product line is its high quality and reliability. This is achieved through the use of virgin, ultrapure and non-cytotoxic polymers from trustworthy suppliers with whom Greiner Bio-One has been dealing for many years. Our experience of producing consistent cell culture treated surfaces alongside with the highest standards for quality control of outgoing goods enable us to supply our customers with products they trust and value. Consequently, all cell culture products feature lowest levels of detectable endotoxins or other contaminants.

**Surfaces for Primary and Stem Cells**

CELCOAT® and Advanced TC™ are two platforms available for the cultivation of sensitive cell lines and primary cells. While products in the CELLCOAT® range are coated with extracellular matrix proteins or mimetics such as Collagen Type I, Fibronectin, Laminin, Poly-D-Lysine and Poly-L-Lysine; Advanced TC™ is an animal-free, physicochemical polymer modification proprietary to Greiner Bio-One. Both solutions trace different paths, but have one common goal – the promotion of essential cellular features, such as:

- Morphology and adherence
- Proliferation
- Transgene activity
- Differentiation status

Advanced TC™ is the first solution for improving assay performance as well as all applications demanding an animal-free substrate supporting sensitive cell lines and primary cells.

CELCOAT® on the other hand is the ultimate solution for cell culture applications requiring the most native culture conditions, such as for stem cells.

The CELLSTAR® cell-repellent surface, achieved through an innovative chemical surface modification, reliably prevents cell attachment. As for formation of stem cell aggregates, a key step within many protocols for cultivation and differentiation of stem cells, the cell-cell interaction must dominate over the interaction between the cells and the culture surface, cell culture vessels equipped with the Greiner Bio-One cell-repellent surface present an ideal platform.

**Technological development, innovation and ingenuity are key to Greiner Bio-One’s successful business. In cell biology the needs of the cells are the driving force of the innovation process. Greiner Bio-One’s research and development (R&D) activities are therefore focused on the steady improvement of labware to provide cells a physiological cell culture environment.**

**The outcome of these R&D activities are proprietary technologies and product lines such as Advanced TC™, CELLCOAT® and the cell-repellent surface. The former allows the improvement of cell attachment and the restoration of physiological culture conditions in vitro. The cell-repellent surface renders a perfect surface for the formation of stem cell aggregates.**

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**CELLCOAT®**

- **hep G2**
- **HEK 293 w/o serum**

**Advanced TC™**

- **Luciferase activity in relative units**

**Improved attachment and cellular morphology on Advanced TC™ cell culture substrates: Hep G2 and HEK 293 cells were cultivated on Advanced TC™ cell culture labware and compared to competitor products and visualised with crystal violet stain.**

**Increased transgene activity on CELLCOAT® and Advanced TC™ cell culture substrates: HEK 293 cells were cultivated on different cell culture substrates and transfected with the pCMV-GLuc plasmid encoding a secreted luciferase. Luciferase activity was assessed by means of light emission after substrate reaction.**

**www.gbo.com/bioscience**
**High Quality Solutions for Microscopy**

**The CELLview™ Product Line**

The CELLview™ cell culture dish and slide are high quality platforms for multiplex and live cell imaging experiments. The dish combines the convenience of a standard size 35 mm disposable plastic dish with the premium optical properties of a glass bottom providing researchers with superior high resolution microscopic images of their in vitro cultures. The embedded CELLview™ coverslip guarantees a single-plane flat bottom with a consistent working distance and maximum planarity. The available TC and Advanced TC™ surface modifications make protein coatings dispensable, while improving general cell attachment on the glass substrate.

The CELLview™ slide consists of a transparent slide with a detachable black upper housing that provides 10 wells within individual experiments can be performed. Similar to the CELLview™ dish, the slide has a 175 µm thick cover glass embedded in its bottom to guarantee an even focal plane which is a prerequisite for all high-speed and high-resolution microscopic applications. The black housing effectively inhibits bleaching of adjacent wells during fluorescent analysis. The wells mimic the size and layout of a standard 96 well microplate. So that the slide is compatible with multi-channel pipettes, making it simple and efficient to use. Furthermore, the round conical well design helps to reduce meniscus effects for optimal results in cell culture and microscopic analysis.

Due to the detachable housing the CELLview™ slides enables additional immunocytochemical staining and embedding for long-time storage.

**The SensoPlate™ Product Line**

SensoPlate™ and SensoPlate™ Plus microplates consist of an optically clear borosilicate glass bottom with a light path of 175 µm and a black polystyrene frame. In addition to fluorescence correlation spectroscopy, microscopic applications such as confocal microscopy are a potential area of application for glass bottom microplates. For mounting the glass bottom plates an adhesive with consistent working distance and maximum planarity. For mounting the glass bottom plates an adhesive with high magnification objectives is used.

SensoPlate™ microplates are suited for:
- Detection of single molecules and fluorescence correlation spectroscopy
- Sophisticated microscopic applications such as confocal microscopy

SensoPlate™ Plus with its short distance between microplate bottom and microplate skirt

- High intra- and interwell planarity for improved automated microscopy
- Borosilicate glass bottom (175 µm) display excellent optical properties with reduced autofluorescence
- SensoPlate™ Plus with its short distance between microplate bottom and microplate skirt

**The SCREENSTAR Product Line**

SCREENSTAR microplates are specialised products for sophisticated microscopic applications, in high content screening (HCS) or high resolution microscopy with water and oil immersion objectives. SCREENSTAR microplates combine outstanding glass-like optical properties with an excellent surface for adherent cell culture and display excellent optical properties with reduced autofluorescence in the lower UV range, low birefringence and a refractive index of 1.53 comparable to glass. Further SCREENSTAR microplates enable complete periphery access for high magnification objectives. These microplates are entirely manufactured out of cycloolefin with a black pigmented cycloolefin frame and a 190 µm ultraclear cycloolefin film bottom.

SCREENSTAR microplates are especially suited for advanced microscopy:
- with water or oil immersion objectives
- with high magnification objectives (40 x and above)
- with high resolution (high numerical aperture) objectives

SCREENSTAR microplates are characterised by:
- Reliable and homogenous cell growth
- Superior optical, highly transparent cycloolefin frame bottom
- Recessed microplate bottom allows low working distance and high aperture
- Protective film on optical bottom to diminish airborne contamination and surface defects
Cell Culture Inserts for Complex and Meaningful in vitro Models

ThinCert™ Products

When placed in a well plate, ThinCert™ cell culture inserts, with porous PET membranes, form a two-compartment system to readily mimic a variety of in vivo situations, such as:

- Migration and relocation of cells
- Paracrine signalling between different cell populations
- Formation of tight cell-cell junctions and epithelial polarisation
- Vectorial transport between two lumens
- Tissue growth and differentiation at the air-liquid-interface

ThinCert™ cell culture inserts combine consistent high quality with a user-friendly format. The PET membrane is firmly attached to the insert housing, but can be easily cut out and subjected to downstream processing, such as immunocytochemistry and sectioning.

Today, a large variety of in vitro models have been established with ThinCert™ cell culture inserts and are routinely used to study cancerogenesis, inflammation, infection and toxicology.

The available Collagen Type I coated product version helps to further facilitate the growth and differentiation of primary cells such as epithelial cells used in transport studies.

3D Cell Culture

Vessels with Cell-Repellent Surface

Vessels equipped with the Greiner Bio-One CELLSTAR® cell-repellent surface support the formation of spheroids, self-assembled spherical clusters used as 3D cell culture models in cancer research and toxicology studies. The CELLSTAR® cell-repellent surface is achieved through an innovative chemical surface modification and reliably prevents cell attachment.

Vessels with cell-repellent surface are ideally suited for:

- Suspension culture of semi-adherent and adherent cell lines
- Spheroid formation in cancer research and toxicology studies
- Formation of stem cell aggregates
- 3D culture in hydrogels

Ideal combination – Nano3D technology and CELLSTAR® Cell-Repellent Surface

The core technology of our partner Nano3D Biosciences is the magnetisation of cells with NanoShuttle™-PL. The cells can be aggregated with magnetic forces, either by levitation or printing, to form structurally and biologically representative 3D models in vitro.

The advantages of magnetic cell culture include:

- Mimicking native tissue environment
- Rapid 3D model formation within hours
- No specialised equipment, media, or artificial substrate
- Easy to handle / no sample loss
- Allows co-culture
- Magnetic particles have no effect on growth behaviour and physiology of cells

With compatible cell-repellent surface cell culture vessels and microplates, Greiner Bio-One offers an ideal platform for the Nano3D technology. The kits contain CELLSTAR® cell-repellent vessels or microplates, the NanoShuttle™-PL solution and the appropriate magnets.
Modern cell culture technology has many overlaps with other technologies, such as process automation and information management. Greiner Bio-One maintains extensive global collaborations with technology partners, thus ensuring compatibility of its cell culture labware and the technology platforms it is used with. One example of a joint development is the AutoFlask™ – a novel cell culture flask for automated cell culture systems which has been developed by Greiner Bio-One in close collaboration with the GenomiX Institute of the Novartis Research Foundation (GNF), San Diego (USA).

Solutions for Automated Cell Culture

Cell culture at the industrial level requires optimised processes that give the best cost-benefit ratios. Specific cell culture labware such as CELLMASTER™ roller bottles meet this requirement. In roller bottles cells grow adherent to the inner lateral surface, while rotation of the device guarantees uniform cell growth as well as alternating supply with nutrients from the culture medium and oxygen from the enclosed air. The enlarged inner lateral surface allows the production of large amounts of cells or cell products in one roller bottle.

While roller bottles have been widely used for years and are common in industrial mass cell culture and vaccine production, new technologies emerged pursuing other approaches for cost reduction and improved efficiency. With respect to such developments process automation plays an important role, requiring innovative cell culture labware.

The AutoFlask™ from Greiner Bio-One is a novel cell culture flask with a microplate footprint. Therefore it can be easily used in conjunction with automated cell culture systems. Its valuable features include:

- Barcodes for flask identification and traceability
- Filter membrane for optimum gas supply
- Silt septum for safe liquid transfer
- Centrifugation pocket for in-flask cell pelletting and harvesting

Cryo.s™ with Datamatrix and Cryo.s™ biobanking tubes combine a long-lasting tradition in tube manufacturing with the latest technology for secure sample identification and automation-compatible sample storage.

All cryo tubes of the Cryo.s™ product line are made of virgin, medical grade and USP class VI certified polypropylene, thus setting standards for polymer purity and absence of leachables. Datamatrix codes on Cryo.s™ are applied using latest laser technologies providing a very robust and permanent identification mark with maximum data capacity. At Greiner Bio-One, all Cryo.s™ with Datamatrix are subjected to a strict quality control before leaving the factory. Part of this quality control is the proof scanning and verification of all Datamatrices according to the AIM DPM2 quality guidelines guaranteeing 100 % readability of the codes. All products are guaranteed to be free of detectable contaminants such as human DNA, RNase, DNase and endotoxins.

With the innovative space-efficient design of Cryo.s™ biobanking tubes Greiner Bio-One provides an excellent solution for large biorepositories. Cryo.s™ biobanking tubes allow for an up to 30 % more efficient usage of freezer space; as a result costs for the acquisition and maintenance of freezers and liquid nitrogen tanks are severely reduced.

Secure and Efficient Sample Identification

Cryo.s™ with Datamatrix for cryogenic sample storage and secure sample identification. The Datamatrix symbol on the tube bottom can encode several alphanumeric characters representing sample information or a unique sample ID.

Cryo.s™ tubes with Datamatrix for cryogenic sample storage and secure sample identification.

Cryo.s™ tubes with Datamatrix for cryogenic sample storage and secure sample identification.

Cross section through a single element of a Datamatrix symbol. In the region of the Datamatrix element, the polymer is modified with a white mark surrounded by the native black polymer. The DPM2 quality guidelines guarantee 100 % readability of the codes.

Cryo.s™ biobanking tubes feature a space-reduced design allowing for up to 30 % less freezer space used for sample storage in large biorepositories.

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200 µm
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