HTS-Microplates

1. Standard Microplate Footprint
The manufacture of user-friendly products is one of our most important goals. All microplates manufactured by Greiner Bio-One have a uniform footprint (Fig. 1) which is conform to the recommendation of the American National Standards Institute (ANSI 1-2004). For detailed information about the external dimensions of our microplates and the conformity with ANSI standards, please visit our website: www.gbo.com/bioscience/technical_information - or ask for data sheets and customer drawings.
For further information about ANSI standards, please visit the society's website: www.slas.org.

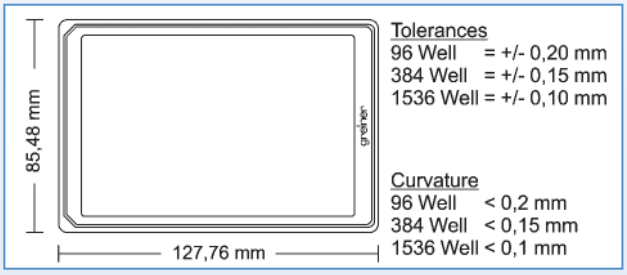

Figure 1:
Footprint and tolerances of standard microplates

2. Material
Polypropylene (PP) and **polystyrene** (PS) are the standard materials used to manufacture the majority of microplates. Polystyrene is a highly clear polymer with excellent optical properties which makes it ideal for precise optical measurements. Polystyrene is also characterised by its ability to bind biomolecules, such as proteins, and it is therefore often used for manufacturing immunological products. Polystyrene is suitable for work with cell cultures.

Polypropylene is characterised by its excellent chemical and thermal stability. It is the ideal polymer for storage vessels or microplates. Polar molecules, such as proteins or DNA, are binding less to polypropylene than to polystyrene.

In addition to polystyrene and polypropylene microplates, Greiner Bio-One manufactures microplates with special requirement profiles, such as the UV-Star® microplates made from different **polyolefins**.
These polyolefins are characterised by their low level of autofluorescence (Fig. 2), exceptionally high clarity, especially in the UV range (Fig. 3), and greater chemical stability when compared with polystyrene.
A listing of chemical compatibilities of the main polymers used (→ Technical Appendix) can be found in Greiner Bio-One forum No. 3 or on our website www.gbo.com/bioscience.

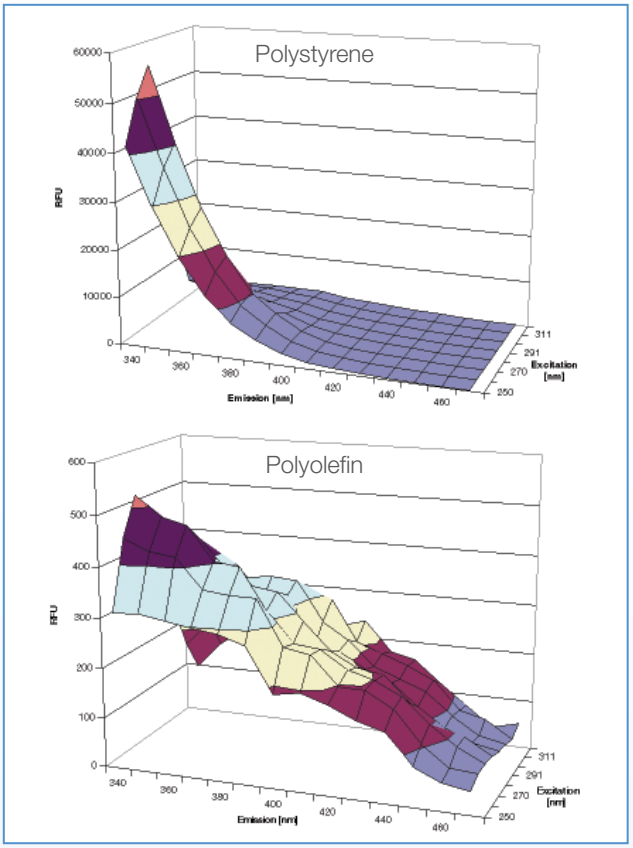

Figure 2:
More than 100 x lower autofluorescence of the UV-Star® polyolefin compared with polystyrene

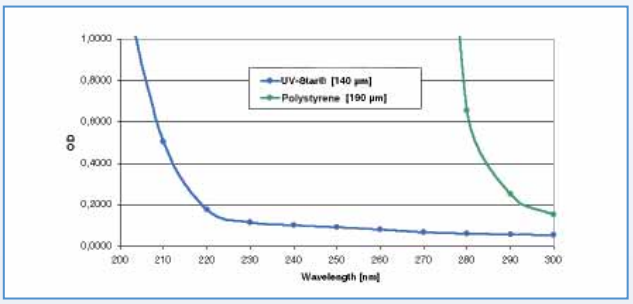

Figure 3:
Light transmission in the UV range. Comparison of polystyrene/polyolefins

3. µClear® and UV-Star®

The move from isotopic to non-isotopic assays (fluorescence/luminescence), and new applications in high-throughput and high-content screening increased the demand for clear bottom plates, microplates with pigmented walls and thin film bottoms.

Up to now, clear bottom microplates have mostly been manufactured using a two-component injection moulding procedure by sticking or welding the components together. The development of a completely new and patented processing technique has made it possible for us to produce microplates with ultra-thin films, without the use of adhesives or solvents – the µClear® and UV-Star® products. This special method eradicates the risk of leaking wells (Fig. 4).

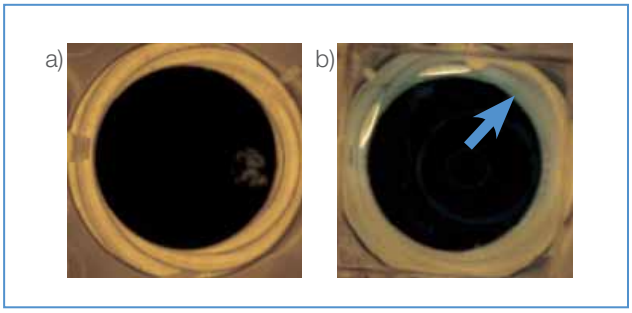

Figure 4:
Wells filled with methylene blue after threefold freezing and thawing:
a) single well of a Greiner Bio-One UV-Star® microplate
b) single well of a 96 well UV-transparent microplate of a competitor

The choice of suitable films is the decisive factor, and this will influence the quality of a clear bottom microplate. Strict controls before and during production guarantee a constant quality. Polarised light is either not depolarised (UV-Star®) or is only depolarised to a slight degree (µClear®) and the autofluorescence of the microplates is minimised (Fig. 5).

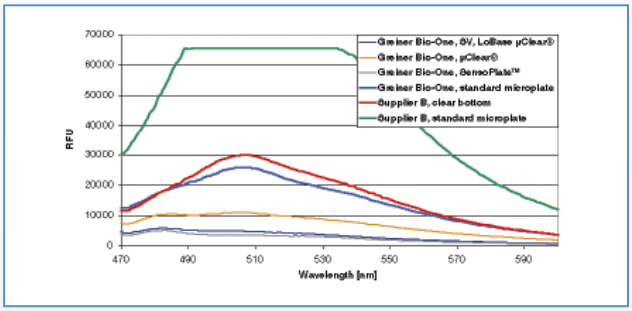

Figure 5:
Autofluorescence of different 384 well microplates at an excitation wavelength of 485 nm

The 96 well µClear® microplates and 384 well µClear® microplates have a film thickness of 190 µm +/- 20 µm. In the 1536 well microplates with a transparent bottom (µClear®) the film thickness is 75 µm +/- 10 µm. UV-Star® microplates generally have a film thickness of 135 µm +/- 10 µm.

4. Black or White?

White microplates are usually used for luminescence measurements (e.g. Luciferase Reporter Assays) and black microplates for fluorescence measurements (e.g. Green Fluorescence Protein). The critical properties in these methods, such as background, autofluorescence or crosstalk are considerably improved by the use of black or white pigmented microplates. The optical and physical properties of the Greiner Bio-One microplates were investigated in our laboratory. Higher pigment concentrations produced a much lower autofluorescence of the microplates. At shorter wavelengths, this influence is more pronounced than at the normal fluorescein wavelength combination of 485/520 nm (Fig. 6, 7). When comparing different white fractions, the same results were obtained for phosphorescence.

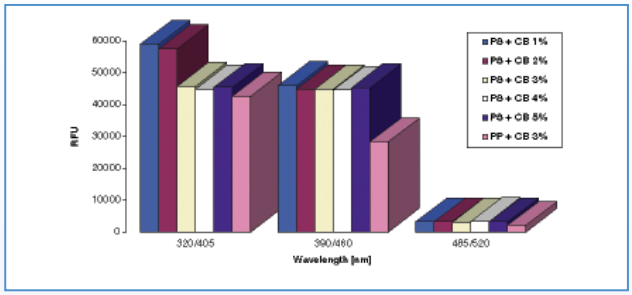

Figure 6:
Influence of the black pigment fraction and the wavelength used on the autofluorescence of 96 well microplates

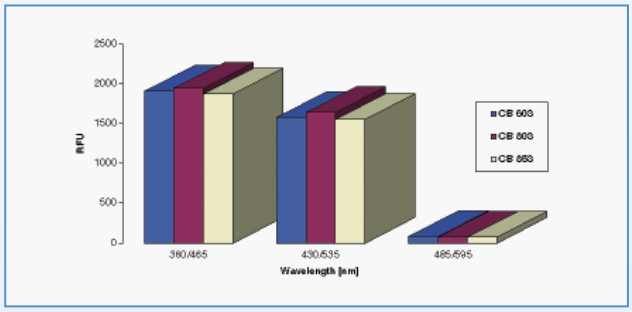

Figure 7:
Influence of different black pigments on the autofluorescence of 96 well microplates

5. MICROLON®, FLUOTRAC™, LUMITRAC™

MICROLON®, FLUOTRAC™, and LUMITRAC™ stand for the quality of our immunology products. MICROLON® are clear microplates for transmission measurements. FLUOTRAC™ are black microplates for fluorescence measurements. LUMITRAC™ are white microplates for luminescence measurements.
MICROLON® 600, FLUOTRAC™ 600 and LUMITRAC™ 600 are high binding polystyrene surfaces that have been specifically treated to provide an increased protein binding. MICROLON® 200, FLUOTRAC™ 200 and LUMITRAC™ 200 are medium binding (med. binding) polystyrene surfaces. The polystyrene surface of a medium binding microplate is more hydrophobic than the surface of a high binding microplate, and therefore tends to be more suitable for non-polar proteins and peptides. The consistency and reproducibility of our immunology products is constantly evaluated using an ELISA (Fig. 8).

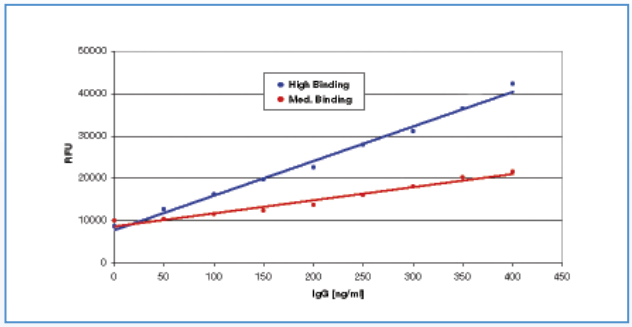

Figure 8:
Fluorescence ELISA

In general, high binding microplates are recommended for ELISAs. The protein binding to the polystyrene surface can vary greatly and depends, among other things, on properties such as charge or size. When developing a new assay, it is therefore advisable to compare high binding and medium binding microplates in advance (→ see chapter 3).

We will be glad to supply samples for evaluation.

6. Non-binding Surfaces

Non-binding surfaces from Greiner Bio-One are characterised by their low binding capacity for biomolecules such as DNA, RNA, peptides and proteins. The repellent property of the non-binding surfaces for biomolecules can be advantageous in biochemical assays by increasing the sensitivity, reducing the background and improving the signal-to-noise ratio.

Achieved through a chemical modification of the resin rather than a resin mixture with potential to leach, the non-binding surface from Greiner Bio-One is stable under common assay conditions and does not degrade during short-term storage. The complete portfolio of non-binding microplates can be found on p. 2 I 30 ff.

7. Cell Culture Products / CELLSTAR® / TC

The polystyrene surface of an untreated microplate is hydrophobic and does not offer adherent cell lines a surface conducive to growth. Cell culture microplates from the CELLSTAR® range are specifically treated. This treatment leads to polar groups, such as carboxy and hydroxy groups, being incorporated into the plastic surface, making it hydrophilic. This significantly improves the adhesion of cells and the binding of proteins to the plastic surface. CELLSTAR® products are consistently evaluated using different cell lines.
Cell culture treated microplates → chapter 1.

8. Lids for Microplates (→ chapter 12)

Four different polystyrene lid designs are available:

- High profile lids
- High profile lids with condensation rings
- Low profile lids
- Ultra low profile lids

Lids are available in two options, sterile and non-sterile. If microplates are supplied with lids, as in the case of CELLSTAR® products, the 96 well microplates always include lids with a high profile ("lid, high profile") and the 384 well microplates always include plate lids with a low profile ("lid, low profile"). In addition all products are also available without lids, which means that the type of lid can be selected as required.

Greiner Bio-One microplates:

- Are manufactured under DIN ISO 9001 guidelines
- Can be traced all the way back to production through a defined LOT number system
- Footprint compatible with automated systems
- Are free of detectable endotoxins (0.03 EU/ml) and regularly tested using an FDA-approved kinetic turbidimetric LAL-test (Limulus Amoebocyte Assay)
- Are analysed for detectable DNase, RNase and human DNA (→ Quality p. V)
- Are manufactured without the use of silicon-based mould release
- Are free of biozides and antistatics
- Are manufactured out of raw materials tested for leachables
- Barcode-labelling on request (→ p. 14 I 4)

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An overview of all 96 well, 384 well and 1536 well microplates listed in this catalogue can be found in the Technical Appendix → p. A I 3 ff.

For further information on microplates from Greiner Bio-One (e.g. quality aspects, dimensions, application notes), please visit the HTS Know-How Platform on our website: www.gbo.com/bioscience/hts