MICROPLATES

Guide to Selecting a Microplate

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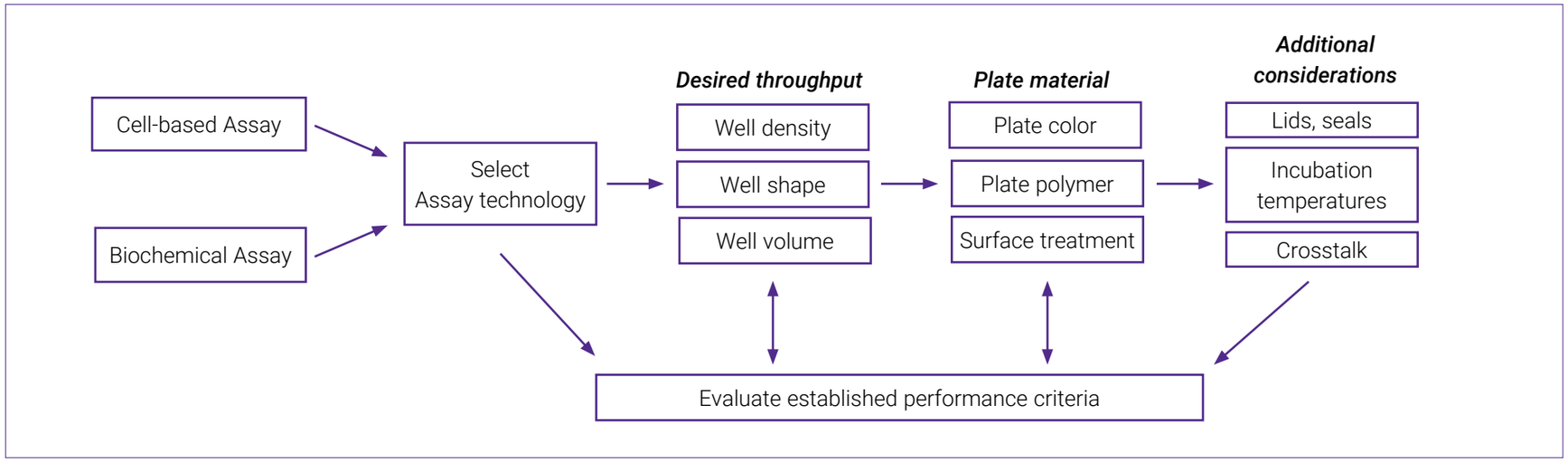
GENERAL CONSIDERATIONS

Assay Considerations

Assays that can be run in a microplate format generally benefit from the ability to use relatively low volumes of reagents in a single assay, the ability to scale assay volume as desired, and the ability to increase throughput (the number of assays that can be run at one time). A variety of microplates are available for a wide range of applications. The correct selection of a microplate can improve assay performance in several ways.

It's important to take the time to really think about what you need in a microplate for your assay before diving in. This guide is intended to help you through the process of choosing the correct microplate for your specific application.



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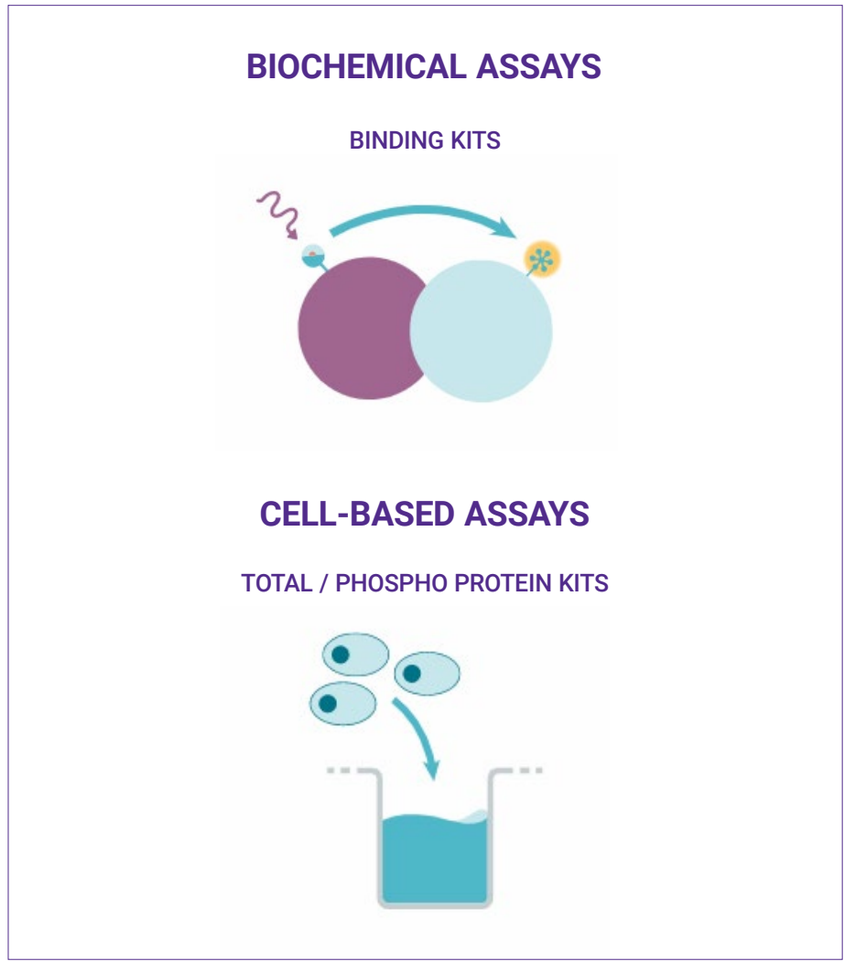
Assay Considerations

When setting out to choose a microplate for your application it's important to first start by thinking about the assay itself rather than the microplate. Will you be performing a cell-based assay? What technology are you using? What throughput do you need? All of these are important to know before you start to look at the microplate itself.

Biochemical vs Cell-based Assays. Cell-based assays may require special considerations that biochemical assays do not. For example – is a sterile, tissue culture treated plate needed? Does the plate need to be coated to promote cell growth? Should the plate have a clear or opaque bottom? You will also need to think about any necessary coating with biochemical assays, but these coating options are different. Knowing if you will be performing a cell-based or biochemical reaction will help with decisions further along in the microplate selection process.



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Assay Technology. The assay technology used will affect what attributes you need in a plate. Will you be performing an absorbance assay, florescence assays, luminescence assay, Alpha, HTRF, or perhaps an HCA assays? Knowing the assay technology will help you make decisions in terms of plate color, material, coatings, and more.

Throughput. It always good to have an idea of your desired throughput. You should consider your throughput needs both when getting started and long term. Maybe you are going to start on a smaller scale and a 96-well plate will suffice and then ramp up and eventually need a 384-well or even a 1536-well plate. Whatever your situation may be, it's important to keep it in mind as you are selecting the right microplate for your application.

You want to learn more about how these no-wash immunoassays compare to the traditional methods? Click here!

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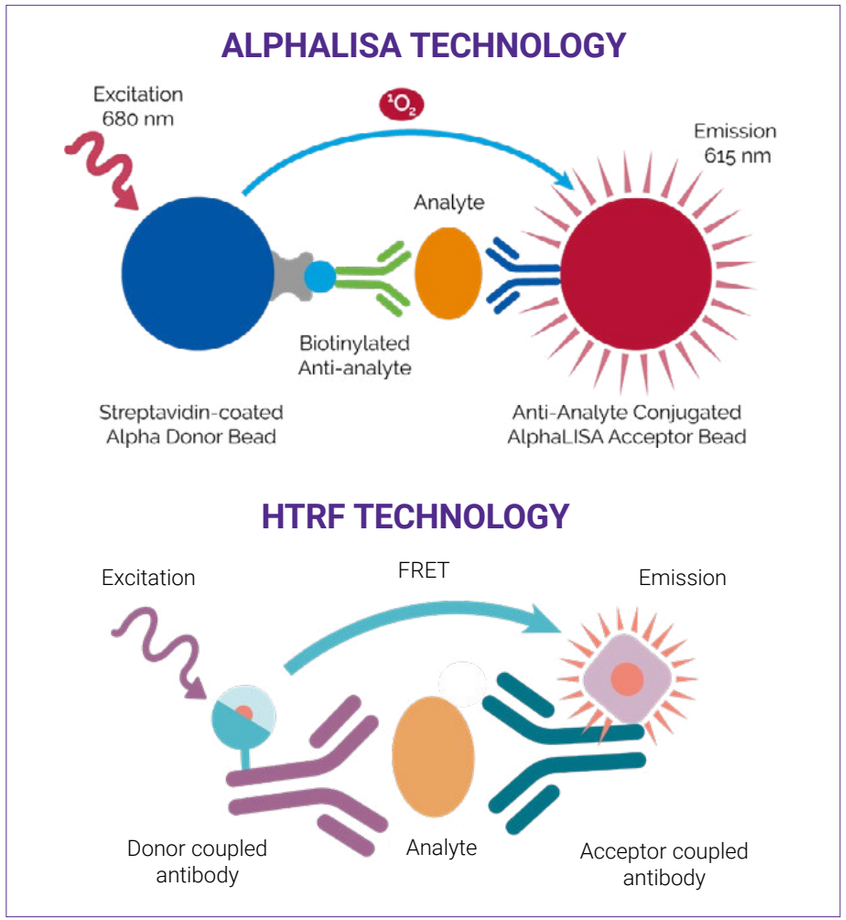

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Microplate Specification Considerations

Once you have determined the needs of your assay, the next thing to do is start looking at specifications of a microplate itself to determine what will work best for your assay. What specifications do you need in the wells of your microplates? What shape, volume, density?

Well Density. The decision on the appropriate well density for your application is not just a matter of desired throughput. Assay performance and any automation capabilities must also be taken into consideration here. For example, the preferred density for a high throughput screening assay may be 1536-well, but it may be that assay performance or automation can only support 96- or 384-well microplates.

Well Shape. The desired well shape will be assay dependent. Round wells have less total area, but they promote mixing, and the lack of corners eliminates wicking effects and may reduce some intra-well effects. Square wells maximize the area for light transmission and can old more liquid than round wells. However, the presence of corners will lead to wicking effects resulting in evaporation and possible cross-contamination between wells.

Well Bottoms. In addition to the shape of the well itself, it is also important to consider the well bottom. Flat-bottom wells allow for maximum transmission of light and are well suited for bottom-reading applications as well as for adherent cell growth. Conical, or v-, bottom wells allows for the maximum retrieval of samples from the well. Rounded, or U-, bottom wells are intended to facilitate mixing, washing and coating. These bottoms are often used when working with suspension cells, spheroids or organoids. Flat bottoms with rounded edges (C-bottom) wells are suitable for optical measurements due to the flatness of the bottom, while the rounded edges facilitate mixing and washing. Like, U-bottom wells, C-bottom wells are well-suited for suspension cells, spheroids or organoids.

Well Volume. In general, the working volume of a well is 75-80% of the maximum volume of the well. Will you need a microplate with normal volume or low-volume wells? When minimizing the volume of reagents used per well, it is important to remember that as a certain point assay performance will decline as a result of the reduced reaction volume. It is at this point where you might want to consider using a low-volume microplate specifically optimize for the use of low reaction volumes.

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In addition to the geometry of the microplate, it is important to consider the properties of the plastic of the plate. Both the material and the color. Depending on the type of assay you are running and the experimental set up, certain options may be beneficial over others.

Plate Color. Is your assay format top- or bottom-read? What detection technology will you be using? If your assay is cell-based, do you need to view the cells during the assay? All these things will play into what plate color is best for your application – white or black, opaque or clear bottom.

- **Clear Plates** are typically used for top- and bottom read Colorimetric/Absorbance assays
- **White Plates** are recommended for use with luminescence assays including AlphaLISA® and AlphaScreen®, as well as for time-resolved fluorescence (TRF) assays. The white color of the plate enhances the luminescence signal by reflecting light. White plates with a clear bottom are can also be used for both bottom-read luminescence and colorimetric/absorbance assays when cell visualization is needed.
- **Grey Plates** have been optimized for Alpha-based assays such as AlphaLISA®, AlphaScreen®, AlphaPlex®, and Alpha SureFire® Ultra™ to enhance luminescence signal while reducing well-to-well cross talk.
- **Black Plates** are recommended for use with top- or bottom-read fluorescence intensity (FI) and fluorescence-resonance energy transfer (FRET) assays, as well as for top-read fluorescence polarization (FP) assays. Black plates quench the background/non-specific fluorescence in fluorescence-based assays, and in general result in less well-to-well cross talk Black plates with clear bottoms can be used for bottom-read fluorescence intensity (FI) and fluorescence-resonance energy transfer (FRET) assays when cell visualization is needed.

Plate Material. The most used materials for microplates are polystyrene (PS), polypropylene (PP), cyclic olefin copolymer (COC), and cyclic olefin polymer (COP). Llight transmission, autofluorescence, water absorption, and gas exchange are properties of polymers used for microplates that can affect assay quality. For example, light absorption by a polymer decreases sensitivity in a fluorescence assays by attenuation of the intensity of the excitation illumination, whereas autofluorescence from a polymer can decreases sensitivity and dynamic range by contributing additional light to the assay emission signal.

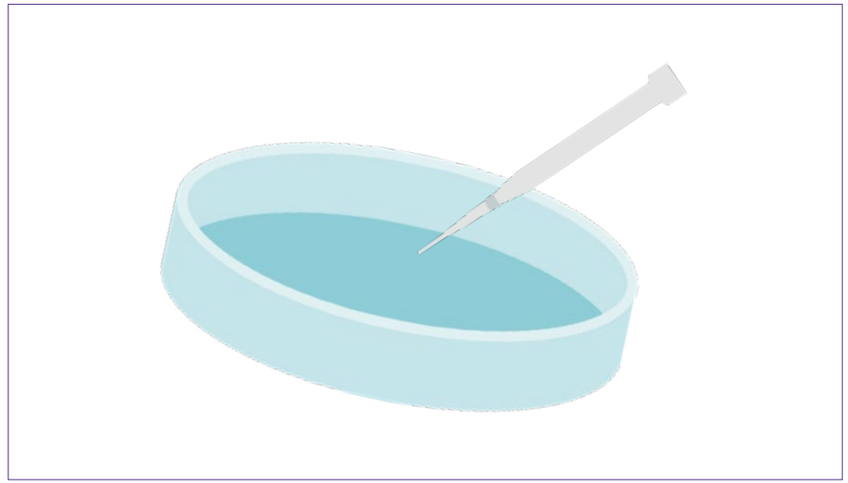
GENERAL CONSIDERATIONS

Treatments and Coatings

Now that you know what you need in the plate itself, let's look at treatments and coatings that might be needed.

Coatings for Culturing Cells
PerkinElmer offers a variety of options for general cell culture needs. Our microplates undergo special physical surface treatment which results in improved and consistent cell attachment.

- **Tissue Culture Treatment** is necessary for polystyrene plates to be suitable for cell attachment. The treatment process involves exposing a polystyrene microplate to a plasma gas, thus modifying the hydrophobic surfaces to make it more hydrophilic. The resulting surface carries a net negative charge due to the presence of oxygen-containing functional groups such as hydroxyl and carboxyl. In general, this will lead to increased cell attachment.
- **Poly-lysine Coating** is used on plate surfaces to help mediate the negative charges of the cell membrane and the negative charge of the surface, thus enhancing cell attachment and binding, especially when working with cells that are difficult to attach and when wash steps are needed. Both Poly-D-lysine (PDL) and Poly-L-lysine (PLL) are commonly used, however PDL is not degraded by cellular proteases and is therefore often the preferred choice. As Poly-lysine is a synthetic protein, it does not influence the signaling pathways of the cells and.
- **Collagen Coating** is used to enhance cell attachment and proliferation. Collagen is the most abundant protein in mammals that is found throughout the body and is a major component of the extracellular matrix (ECM).
  - Collagen I is suitable for endothelial and epithelial cells, muscle cells and hepatocytes
  - Collagen IV is the major constituent of basement membranes and offers more physiologically relevant conditions to cells as well as improving the adherence of specific cell types i.e. PC-12 (rat adrenal pheochromocytoma cell line).
- **Ultra-low Attachment Coating** prevents cell attachment to the culture vessel, thus supporting the formation of 3D spheroids and organoids through cell-to-cell interactions. These 3D models better simulate natural cellular interactions and better mimic in vivo microarchitecture compared to traditional 2D cell culture models.



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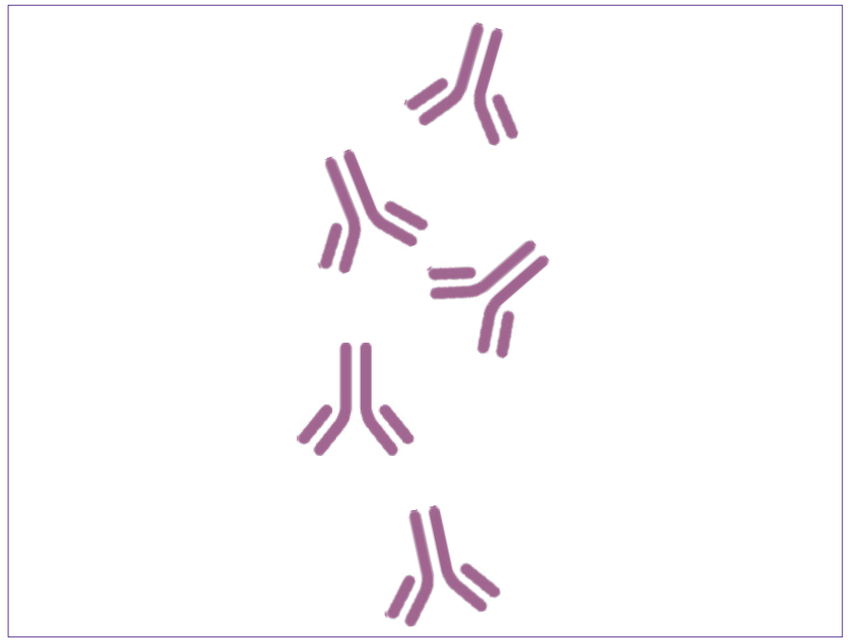
Now that you know what you need in the plate itself, let's look at treatments and coatings that might be needed.

Immunological Treatments and Coatings
Generally, for immunology-based applications, immobilization of biomolecules to the well surface of a microplate is required. PerkinElmer offers both a low and high binding surface. The high binding surface features a relatively high number of polar groups, whereas the number of polar groups is limited on the low binding surface.

- **High Protein Binding Treatment** allows for capturing proteins and antibodies to the microplate. It is used for washed-based assays such as ELISA and DELFIA®.
- **Low Protein Binding Treatment** results in reduced binding to proteins and nucleic acids. It is used for biochemical assays to reduce non-specific binding.
- **Streptavidin Coating** is used to create generic plates for solid-phase assays, such as ELISA and DELFIA® immunoassays. Streptavidin will bind biotinylated antibodies, biotinylated proteins, and other biotinylated moieties, anchoring the biotinylated reagent to the well of the plate.
- **Antibody Coating** is also frequently used to create plates for solid-phase assays. The surface of the microplates is coated with a specific antibody to capture and immobilize your protein of choice for your ELISA or DELFIA® immunoassay.



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Additional Considerations

Now that you have limited your microplate options, there are a couple of other things to consider before making your final decision.

Cross-talk. Cross-talk occurs when light from one well travels through the well walls into adjacent wells and is then detected, adding non-specific counts to that well. Assays that produce high signals are more prone to cross-talk. In addition to signal strength another assay component that can lead to cross-walk is the emission wavelength. The wavelength of the emission is, the higher the energy level is, and the more cross-talk may be observed. Cross-talk can also be caused by factors relating the microplate used. Both the transparency of the plastic and the design of the microplate itself can impact the magnitude of cross-talk in an assay.

- **Microplate Plastic.** The color of the microplate plastic can greatly affect the amount of cross-talk seen in a given assays. Clear plates can have the highest cross talk, with black plates having the lowest. White plates give medium cross-talk, with the magnitude of the cross-talk being dependent on the concentration of titanium dioxide used as whitener. Gray plates have lower cross-talk than white plates, but higher cross-talk than black plates.
- **Design of Microplate.** The thickness of adjacent wells, thickness of the bottom, well-to-well distance and the well geometry itself can all factor into the magnitude of cross-talk detected in a given assay.

Wicking. "Wicking" refers to the phenomena in which liquid from one well travels up the well-wall via capillary action. The risk with wicking is evaporation and potential well-to-well contamination. Wicking is influenced by plate well geometry, laboratory environment (static charges) and assay buffer components and their interaction with the microplate plastic.

The Edge Effect. In microplate-formatted assays, the term "edge effect" refers to the observation that the measurement obtained from wells on the edge of the plate are often statistically different from wells towards the center of the plate. This can occur in both biochemical and cell-based assays and can be caused by multiple factors which may be difficult to identify and correct. While there have not been any systematic studies highlight the causes of edge effect it has been observed that thermal gradient, evaporation, and well density may all play a role. Some recommendations to help reduce edge effects include minimizing any temperature gradients or other environmental factors that may differentially affect areas of the plate, coving the plate during incubations to avoid evaporation, and using incubators with adjustable humidity as at a relatively high humidity evaporation will be minimal.

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Now that you have chosen your microplate. There are a few final things to consider.

- Sterility. For cell-based assays in which tissue culture treatment is needed, plates are typically supplied sterile. For other assays you may or may not need your microplate to be sterile.
- Do you need lids or seals for your assay?
- Will you be incubating the plates, and if so at what temperature?
- Will you need barcoding on your microplates?

Because we know selecting the right microplate can considerably improve your assay performance, we have compiled for you all the aspects you need to considerate when choosing your microplates and consumables among the variety of our catalog, depending on the type of assay and application intended.

LEARN MORE HERE

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SELECTING A MICROPLATE BASED ON APPLICATION

When you set out to choose a microplate for your assay the first things to consider, as mentioned earlier, are whether you will be performing a biochemical or cell-based assays and what technology you will be looking.

This section looks at specific considerations to consider when choosing a microplate based on the technology you will be using. There are different things to thinking about when performing a fluorescence-based, luminescence-based or high content screening assay.

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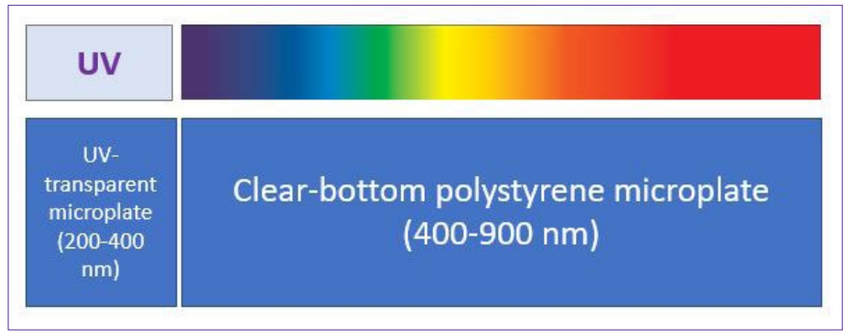
Absorbance Assays

Absorbance and colorimetric assays are designed to detect or quantitate the amount of a particular analyte in an assay. This is accomplished by measuring the amount of light absorbed by the analyte or chromogenic reaction product at a characteristic wavelength, which is specific to the reagent being measured. The greater the amount of analyte there is present in the well, the more light that will be absorbed. Common absorbance assays include colorimetric ELISAs, and Bradford assays.

Wavelengths and Signal. Absorbance assays that measure absorbance in the visible range (400 – 900 nm) are typically run in clear, polystyrene microplates as these plates should not absorb light in the visible range. Absorbance assays that measure absorbance in the ultra-violet range (200-400 nm) require plates made of a UV transparent material to avoid absorbance of light by the plastic itself.

Cross-talk. Cross-talk occurs when absorption from a neighboring well interferes with the measurement of the well-of-interest. This can be problematic when using plates with higher density formats such as 384-well and 1536-well microplates. In such cases, the use of clear-bottom plates with white wells are recommended.



Your microplate is intended for a cell-based assay? Check out the most frequent questions scientists ask themselves when choosing the plate, and our answers!

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Fluorescence Assays

Fluorescence is the emission of light by a substrate resulting from energy acquired when the substance is excited using light at a different wavelength than the emission signal. In fluorescence-based assays, the chemical or dye that fluoresces is referred to as a fluorophore. There are several difference fluorophores, and each one has its own unique spectral properties, requiring excitation at a particular wavelength, and releasing light at a particular emission wavelength. The excitation and emission wavelengths are not discrete wavelengths, but rather a range of wavelengths characteristic to a given fluorophore. In a typical fluorescence-based assay, the fluorophore is excited by light at a given wavelength, and the signal at an emission wavelength is measured using a plate reader. Examples of fluorescence assays include fluorescence intensity (FI) and fluorescence polarization (FP) assays, FRET assays (Förster resonance energy transfer assays), fluorescent calcium flux assays, TRF assays (time-resolved fluorescence assays, and TR-FRET assays (time-resolved Förster resonance energy transfer) assays.

The microplate color recommended for fluorescence-based assays differs based on the type of fluorescence-based assay and the properties of the fluorophore being use. The greatest consideration for fluorescence-based assays is autofluorescence which is fluorescence resulting from substances other than the fluorophore-of-interest. Many components of assay buffers and biological samples can autofluoresces, and this signal can increase the background signal thus negatively affecting the assay. Autofluorescence is triggered by the same excitation light used to excite the fluorophore in the fluorescence assay. The severity of background autofluorescence can vary based on the excitation wavelength being used in a particular assay. For example, higher excitation wavelengths (above 650 nm) usually cause less autofluorescence than wavelengths in the UV/Vis range.

White plates reflect light and black plates tend to quench light. For this reason, background fluorescence will be higher in white plates than in black plates. Therefore, black plates are typically recommended for fluorescence-based assay that use short half-life fluorophores. Time-resolved fluorescence assay, which use longer half-life fluorophores, can use either white or black plates. Let's take a closer look at the different types of fluorescence-based assays.

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Fluorescence Assays Continued

General Fluorescence Assays. General fluorescence assays include fluorescence intensity (FI), fluorescence polarization (PI), and FRET assays. These assays use traditional fluorophores such as fluorescein, cyanine 3, cyanine 5, green fluorescent protein (GFP), rhodamine, Texas Red, coumarin, and other fluorophores which have relatively short half-lives. It is recommended to run fluorescence-based assays utilizing short half-life fluorophores on black microplates to reduce the background autofluorescence.

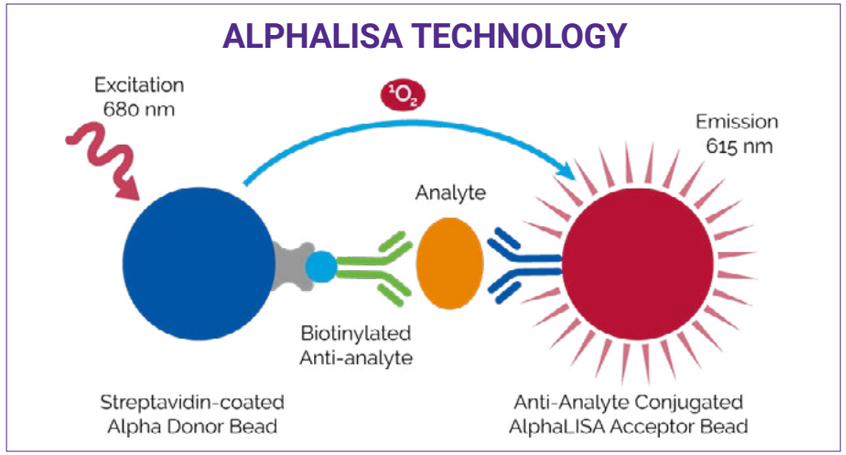
Time-resolved Fluorescence Assays. Time-resolved fluorescence assays utilize fluorophores like Europium chelates and cryptates, Samarium chelates, and Terbium chelates and cryptates, which have longer half-lives. Due to the increase in half-life, assays came be set up to incorporate a "lag" between exciting and reading of the emission which also for autofluorence to fade before the sample is run without negatively impacting the assay and so either black or white plates can be used with these assays.

Cross-talk. As we know, white plates reflect light and black plates tend to quench light and as such white plates result in higher raw signals than black plates due. However, if the signal is too high, cross-talk is something that need to be considered. Cross-talk occurs when light from one well travels through the well walls into adjacent wells and is then detected, adding non-specific counts to that well. In cases with a strong signal, a black plate may be preferential as cross-talk will be reduced and sensitivity will be better.

Plate Density. As the well density format of a plate increases, the use of white microplates becomes more advantageous. In general, it is recommended to use white plate for time-resolved fluorescence assays using 384-well or 1536-well plate formats, and to use black plates for 96-well assay formats. The reason behind this is related to the amount of fluorophore present in the sample well. For example, an assay run in a 1536-well plate has a typically total assay volume of 4-10 µL resulting in much less fluorophore in a signal well than would be present in a 96-well plate with a working volume of 80-350 µL. Using a white plate will help maximize the output signal to ensure it is in within the dynamic range of the assay and reader.

Table 1: Fluorescence assays.

Fluorescence Assay	Relative Fluorophore Half-Life	Recommended Microplate Color
Fluorescence Intensity (FI)	Short	Black
Fluorecence Polization (PI)		
Förster resonance energy transfer (FRET)		
Time-resolved Fluorescence (TRF)	Long	96-well plates – black 384- and 1536-well plates - White
Time-resolved Förster resonance energy transfer (TR-FRET)		



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Luminescence Assays

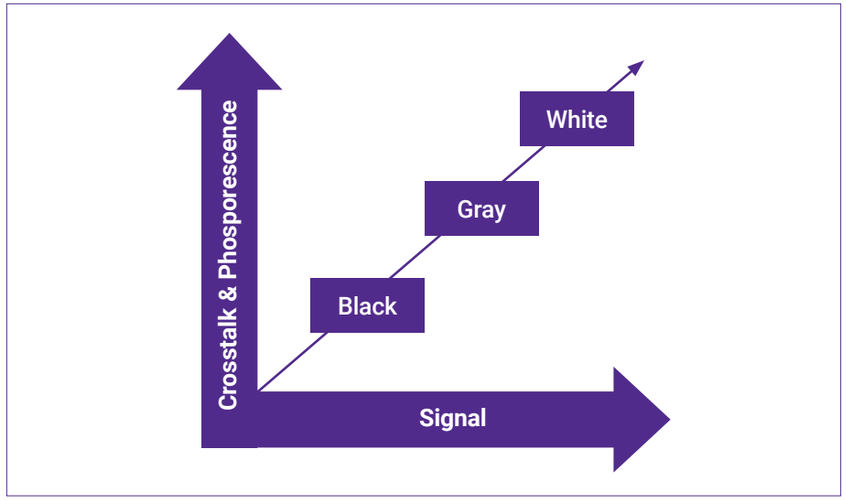
Like fluorescence-based assays, the output generated in luminescence-based assays is light. However, unlike fluorescence-based assays, the light generated from the chemical or biochemical reaction taking place in luminescence-based assays is not restricted to a particular wavelength. Common luminescence-based assays include, Alpha immunoassays, luciferase-based reporter gene assays, luciferase-based cytotoxicity and cell proliferation assays, calcium assays, and chemiluminescent ELISAs.

The general go-to microplate color for luminescence assays is white as white plates offer the maximum reflection of ling and so result in a higher signal. Black plate absorb the light resulting in a quenched signal. However, depending on your particular luminescence-based assay the choice may not be so straightforward. Let's take a look at some of the things to consider when choosing a microplate color for luminescence-based assays.

Signal and Crosstalk. As mentioned, white plates produce a higher signal than black plates. White plates are recommended when an assay produces a low signal or when you are working in higher density formats, such as 1536-well plates. Bigger isn't always better though, when an assay gives a strong signal, an additional consideration known as crosstalk comes into play. Cross-talk occurs when light from one well travels through the well walls into adjacent wells and is then detected, adding non-specific counts to that well. Because white plates reflect the most light, they also tend to give the highest cross talk. For this reason, for luminescence-based assays that have a strong enough signal to counter any quenching and still be detectable, black plates may be beneficial.

Phosphorescence. Phosphorescence may also be a consideration to consider when choosing between white and black microplates. Phosphorescence is the emission of light be a substance resulting from stored energy. A non-specific phosphorescence signal maybe be a factor of multiple components of a given assay such as a buffer, the sample itself, or the plastic from the microplate. Phosphoresence can lead to increase background which could potentially have a negative impact on a given assay. Black microplate intrinsically exhibit less less phosphorescence than white microplates and may be desirable for particular assays. However, we know that for many assays white plates are preferential. In that case, assays run in white microplates can be "dark-adapted" by shielding the microplate from light for up to 10 minutes prior to reading the plate in order to reduce background phosphorescence if this is a concern.

Gray Microplates. With some microplates, a third color option is available in addition to white and black. Gray microplates can be helpful as they can offer reduced cross-talk and reduced while still maintaining high signal. Gray microplates are specifically designed to give low-background while maintaining high signal.



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High Content Screening

There's a bit more involved in choosing a microplate for high content screening than there is with some of the other applications discussed so far. High content screening plates have to fulfill several, sometimes conflicting, demands including:

- Provide a suitable environment for cellular growth
- Have excellent optical quality
- Have good flatness
- Be compatible with the objective lens

For most high content screening applications, the ese of black pigmented plates with a clear, flat, low, polystyrene (PS) or cyclic olefin bottom for cell culture is suitable. However, there are several things to take into consideration when choosing a microplate for high content screening purposes.

Plate Bottom Material and Planarity. When choosing a microplate for high content screening it is important that the plate provide a suitable environment for cell growth, have good optical quality, and good flatness (planarity). The material the bottom of a microplate is made up affects each of these parameters. Most microplates are made of polystyrene. When tissue-culture treated polystyrene does provide a suitable environment for most cell growth, however both its optical quality and planarity are poor. Glass is another material options for the bottom of a microplate. Like polystyrene, glass required an additional step in order to be suitable for cell growth (PDL or collagen coating). However, it has better optical quality and high planarity. Cyclic olefin is a polymer that both supports cell growth (as is) and has good optical quality, combing the best of polystyrene (cell growth) and glass (optical quality). In addition to this, cyclic olefin plates show good planarity at various plate densities and are the recommended plate for HCS and HCA applications.

Table 2: Plate bottom material and planarity.

Material	Cell Growth	Optical Quality	Planarity
Polystyrene	TC-treatment required	Poor	96-well – poor 384- and 1536-well OK with thin bottom only
Glass	PDL or Collagen coating required	Good	High
Cyclic olefin	Supports as is, as these plates are TC-treated by default	Good	Good

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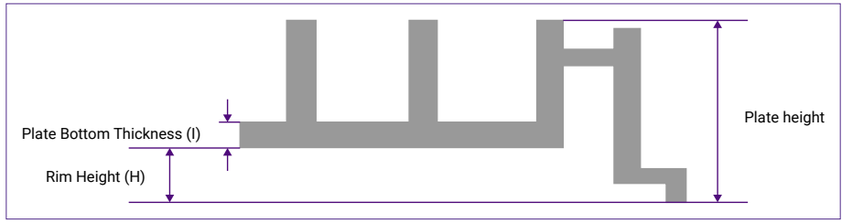
SELECTING A MICROPLATE BASED ON APPLICATION

High Content Screening

Plate Geometry and Thickness. Another consideration that is needed when choosing a microplate for high content screening is that the microplate and the objective lens much be compatible. The geometry of the plate as well as the thickness of the plate bottom are two plate features that affect this compatibility. Typically, thin bottom (< 200 µm) microplates are recommended for high content screening as they can be used with high numerical aperture objectives. High NA objectives typically have a short working distance, but provide better resolution, and collect more light from the specimen than long working distance (long WD) objectives. Thick-bottomed plates (>250 µm) require the use of long WD objectives, which typically have a lower numerical aperture. In addition to the thickness of the plate bottom, the distance between the plate bottom and the plate rum also affects the choice of objective. High-bottomed plates (H value > 300 µm) are often not suitable for an objective with a high NA or a water immersion objective as it would collide with the rim of these plates.

Table 3: Plate Geometry and Thickness.

Relationship of Working Distance (WD) of Objective to Microplate Dimensions (H=Rim Height, I=Plate Bottom Thickness)	
Relationship	**Plate and Objective Compatible?**
WD < H+I	No
WD > H+1	Yes
WD + 1 mm < H+1	Yes



ADDITIONAL CONSIDERATIONS FOR CELL-BASED ASSAYS HERE

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SELECTING A MICROPLATE BASED ON APPLICATION

High Content Screening Continued

Plate Format. Just like with any of the assays discussed here, each well density offers advantages and disadvantages. Please see Table 4. for more information on the advantages and disadvantages different plate formats offer for high content screening.

3D Spheroids. It has been demonstrated that in many cases, three-dimensional (3D) cell culture can better recreate a biologically-relevant cellular environment, when compared to two-dimensional (2D) monolayer cell culture. To allows spheroids to form, which better simulate natural cellular interactions and better mimic in vivo microarchitecture, plates much have an ultra-low attachments (ULA) surface. The ultra-low attachment coating prevents cell attachment to the culture vessel and supports the formation of 3D spheroids and organoids through cell-to-cell interactions.

Table 4: Plate formats.

Well Density	Advantage	Disadvantage
96-well	•Easier to use in manual mode •Better suited for long-term live cell applications as the cells are less influenced by evaporation	•Requires a higher working volume which equals higher cost •Most 96-well plates with thin polystyrene bottoms cannot be recommended due to an insufficient planarity
384-well	•Small working volume – cost effective solution for high throughput •Good planarity	•Handling several plates in a manual mode, even using 16-channel pipettes, can be highly inaccurate •Automated liquid handling devices are recommended
1536-well	•Very small working volume – cost effective solution for high throughput •Good planarity	•Handling plates in a manual mode is not recommended •Automated liquid handling devices are recommended

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Additional Considerations for All Cell-based Assays

The optimal microplate for a cell-based assay will be dependent on both the specific cell line being used in the assay and the assay protocol itself. Questions that need to be answered in choosing the plate include:

- Do I need a sterile, tissue culture-treated plate?

  This depends on the length of time the cells will be in the assay plate. In some cases, cells are plated and the assay run within a few minutes or hours. In other cases, cells are grown in plates at least overnight of perhaps even for several days. In general, if an assay is going to be run in a single working day, tissue-culture treatment in not necessary. If the cells will be plated overnight or longer then a tissue-culture treated plate should be used.

- Does the plate need to be coated?

  Whether or not you will need an additional coating on the tissue-culture treatment plate will depend on the specific cell lines used, and how the cells will be treated throughout the assay. Tissue-culture treatment is designed to specifically promote cell attachment and growth. If you are working with cells that are strongly adherent, it is likely that this will suffice, and no coating is necessary. However, if you are working with cells that adhere relatively poorly it may be beneficial to include a coating, such as PDL or collagen, to further promote attachment and growth. In general, cell-based assays using suspension cells are generally performed in tissue-culture treated plates and do not require any coating.

  In addition to the specific cell line being used in the assay, the assay protocol itself is important in deciding the type of plate to use. For example, assays using adherent cells may include culture medium changes or wash steps in the protocol. In such cases it may be advisable to use a coated plate for the assay in order to prevent the cells from becoming detached from the plate during the assay.

- Should the plate have a clear or opaque bottom?

  There are two situations that would require the use of clear-bottom microplates over opaque bottom microplates. The first is depended on the reader being used. If the microplate reader that will be used is bottom-reading only then a clear-bottom microplate is required for the fluorescence assays. The other situation which would require the use of a clear-bottom microplate is if the cells need to be imaged throughout the course of the assay. If microscopic visualization of the cells to monitor confluency, morphology or other parameters that may affect the cellular response in the assay, then a clear-bottom microplate should be used. If neither of this situations applies to your assay, then an opaque-bottom microplate will suffice.

  It is worth noting that clear-bottom plates can be converted to functionally opaque plates by application of a BackSeal™ Adhesive Bottom Seal. The color of the BackSeal plate seal should match the color of the sides of the plate wells. These seals are available in both black and white

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PERKINELMER MICROPLATES BY APPLICATION

Here is a look of the different family of microplates PerkinElmer offers and what assays they are suitable for.

Table 5: PerkinElmer microplates.

	Absorbance/Colorimetic Assays	Fluorescence Assays	Luminescence Assays	High Content Screening/ Imaging	Next Generation Sequencing	Storage
AlphaPlate			X			
CulturPlate		X	X			
DELFIA Plate		X				
HardShell PCR Plate					X	
IsoPlate	X	X	X			
OptiPlate		X	X			
PhenoPlate				X		
ProxiPlate		X	X			
SpectraPlate	X					
StorPlate					X	X
ViewPlate				X		
VisiPlate		X	X			

EXPLORE OUR MICROPLATES BY APPLICATIONS

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PerkinElmer® For the Better

PERKINELMER MICROPLATES BY APPLICATION CONTINUED

Here is a closer look at the microplates PerkinElmer offers and what formats they are available in.

Table 6: PerkinElmer microplates.

	96-well	384-well	1536-well	1/2Area	Shallow well	Clear	White	Black	Other	Tissue Culture-Treated*	PDL Coated*	COL Coated*	High Binding Surface*	Low Binding Surface*
AlphaPlate		X	X	X	X				Gray	No				X
CulturPlate	X	X	X				X	X		Yes				
DELFIA Plate	X					X			Yellow	No				
HardShell PCR Plate	X	X							Blue frame, clear wells	No				
IsoPlate	X						X Clear wells	X Clear wells	Black frame, white wells	Select Plates are TC-treated			X	
OptiPlate	X	X	X	X			X	X		No			X	X
PhenoPlate	X	X						X		Yes	X	X		
ProxiPlate	X	X			X		X	X		Select Plates are TC-treated			X	
SpectraPlate	X	X	X	X	X	X				Select Plates are TC-treated			X	X
StorPlate	X	X							Natural	No				
ViewPlate	X	X	X	X			X Clear wells	X Clear wells		Select Plates are TC-treated	X	X		
VisiPlate	24-well						X Clear wells	X Clear wells		Select Plates are TC-treated				

**Available as a custom service if microplate is not already available*

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PerkinElmer® For the Better

COMPLIMENTARY PRODUCTS

PerkinElmer offers a full portfolio for your microplates assay needs. In addition to microplates and seals, we offer reagents and instrumentation

Instrumentation

PerkinElmer's microplate-reading instrumentation is validated with our microplates ensuring maximum performance between the two.

Microplate Readers. PerkinElmer offers a selection of configurable plate readers ensured to suite the individual needs of your lab.

High Content Screening. With powerful yet simple imaging and analysis capabilities for a wide range of applications – from basic research to assay development and screening – PerkinElmer's powerful high content imaging systems produce the highest possible image quality to take your research further, in less time than ever before.

Fluorescence-based assays

PerkinElmer offers TR-FRET assays as well as traditional time-resolved fluorescence assays.

TR-FRET Assays. TR-FRET combines the benefits of Time Resolved Fluorescence (TRF) with those of Forster Resonance Energy Transfer (FRET). PerkinElmer offers two TR-FRET technologies - HTRF® (Homogeneous Time Resolved Technology) and LANCE® (Lanthanide Chelate Excite) Ultra™ TR-FRET.

TRF Assay. DELFIA® (Dissociation-Enhanced Lanthanide Fluorescence Immunoassay) is a washed based, time-resolved fluorescence (TRF) detection platform that utilizes fluorescent lanthanide chelates rather than other fluorophores. While superficially quite similar to an ELISA, DELFIA® comes with additional benefits. DELFIA® has a stable, time-resolved fluorescent signal which improves the assay dynamic range.

You want to learn more about how these no-wash immunoassays compare to the traditional methods? Click here!

WATCH WEBINAR

Luminescence-based assays

PerkinElmer offers luminescence-based assays including Alpha assays and luminescence-based report gene and cytotoxicity assays.

Alpha assays. PerkinElmer's Alpha technology is a homogeneous, bead-based assay platform offering several advantages over traditional ELISAs. This versatile, easy-to-use platform is suitable for a wide range of applications. Alpha technologies include AlphaLISA® AlphaLISA® SureFire® Ultra and AlphaScreen® assays.

Report gene assays. Whether your assay requires the sensitivity provided by high signal intensity, or the flexibility of an extended signal half-life, PerkinElmer offers a reporter gene assay to suit your needs your needs.

Cytotoxicity and Cell Proliferation Assays. PerkinElmer's ATP luminescence assays provide a more sensitive alternative to colorimetric, fluorometric, and radioisotopic based assays for monitoring cell viability and proliferation. Choose our ATPlite 1step assay for a single addition assay and our ATPlite assay for extended signal stability.

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For more information visit www.perkinelmer.com/microplates

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