Octet® SPR

Sensor Chips

Simplifying Progress

SARTORIUS

SPR Sensor Chip Selection

Sensor chip selection is a critical feature of every SPR assay. From initial design and development, to data acquisition and analysis; the overall data integrity is influenced by initial sensor chip selection. Therefore, a number of different variables need to be taken into account when choosing a sensor chip, including:

- **Assay Application**
  Whether kinetics, affinity or molecule screening are being investigated
- **Molecular Weight**
  Whether low, intermediate or high molecular weight ligands or analytes are being analyzed
- **Binding Capacity**
  The overall analyte mass which can be bound to the sensor chip due to the immobilized or captured ligand

The unique properties of each SPR sensor chip should therefore be considered in the initial assay design in order to align with the overall goals of the assay and to ensure accurate and reproducible results.

Octet® SPR Sensor Chips

Octet® SPR sensor chips are comprised of a thin glass slide coated with a semi-transparent gold film, protected by a rigid plastic outer cassette to shield the gold surface from direct handling (Figure 1). The gold surface of many Octet® SPR sensor chips are coated with an additional layer of carboxymethylated dextran which allows covalent modification of the surface using a range of chemistries, including amine and thiol. This allows the user to study a wide variety of molecules such as proteins, antibodies, nucleic acids and small molecules, in order to generate kinetic, affinity, concentration and binding specificity data in real-time.

Octet® SPR Sensor Chip Classification

Octet® SPR sensor chips can be classified according to a number of variables, such as their immobilization matrix (2D or 3D), their binding capacity (low, medium or high), or the type of bond formed with the ligand (covalent or affinity capture).

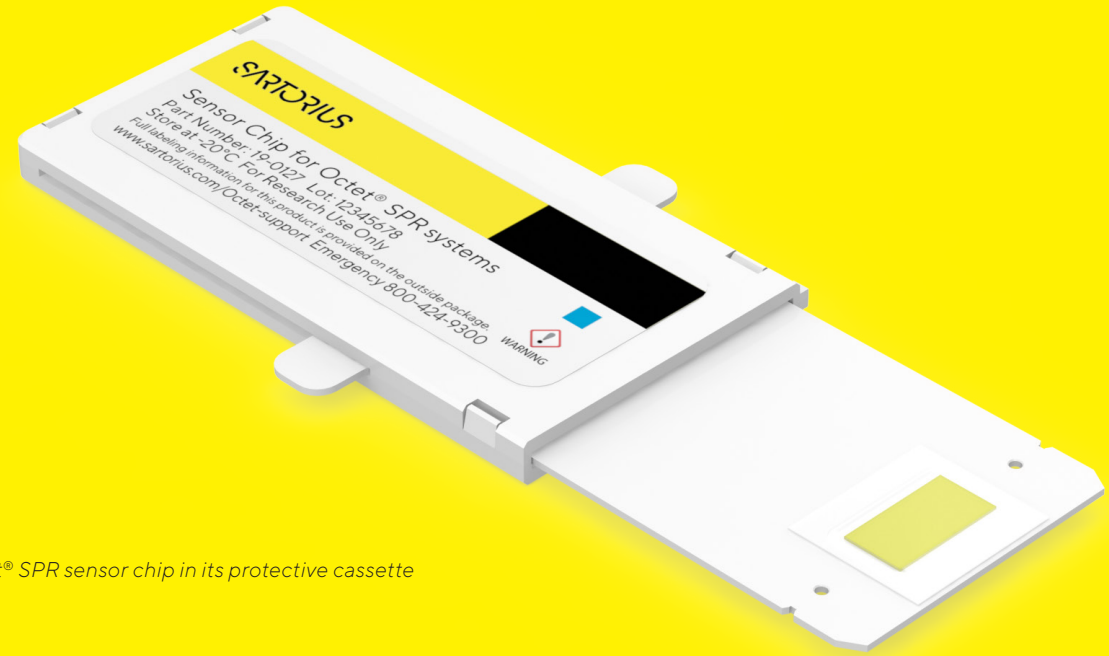


Figure 1.
Typical Octet® SPR sensor chip in its protective cassette

2D - Planar Sensor Chips

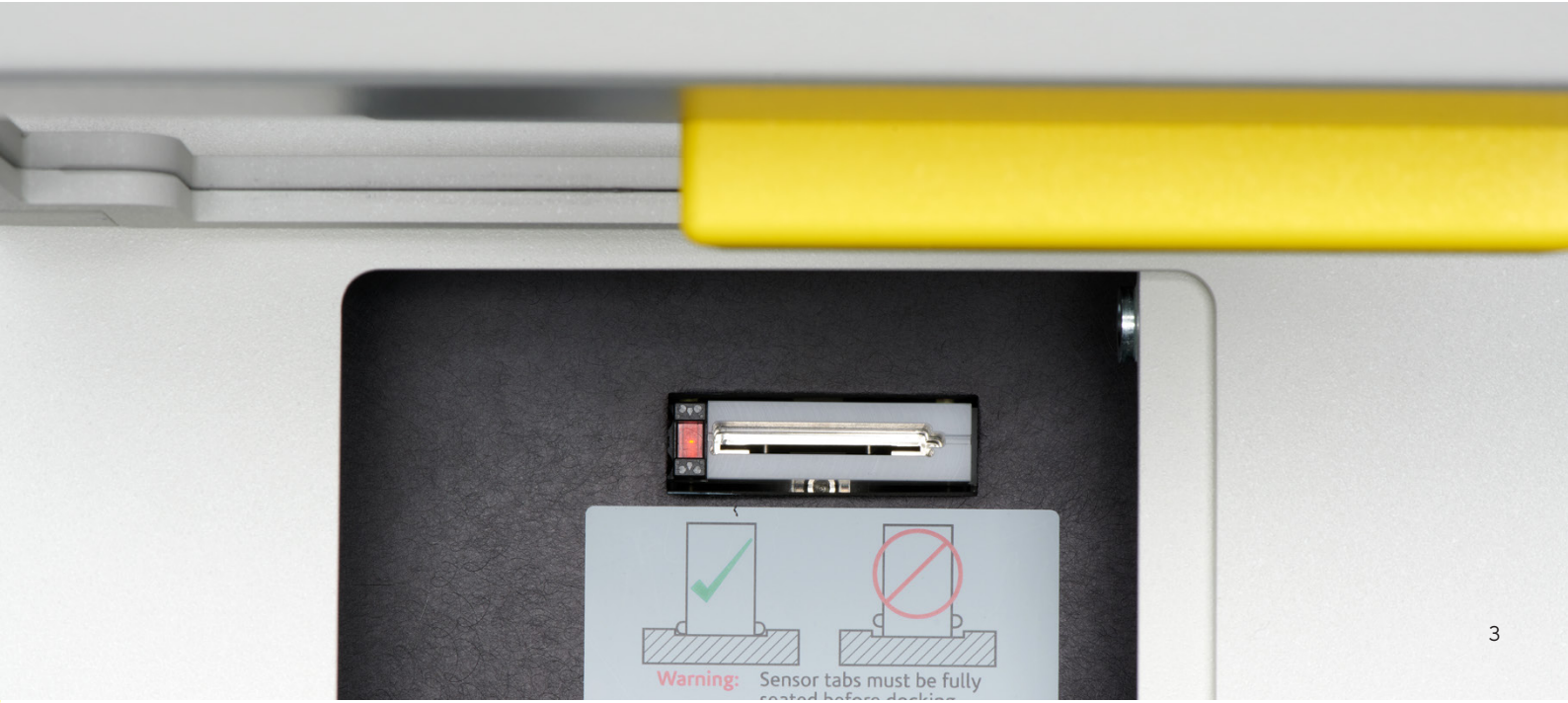
2D - planar SPR sensor chips are characterized by a carboxylated but matrix-free surface, which facilitates a low binding capacity. The lack of a matrix results in the generation of a flat planar interface, which allows interactions with large molecules, molecular complexes, viruses or whole cells to take place closer to the sensor surface, resulting in a higher interaction sensitivity. Such sensor chips are predominantly used for work requiring a low ligand density to minimize any potential avidity effects.

3D - Planar Sensor Chips

3D SPR sensor chips are generally modified with a carboxymethylated dextran matrix to allow the immobilization of high densities of ligand to the sensor chip surface, and can be individually classified according to their level of binding capacity.

In general, the longer the dextran chains, the greater the binding capacity, which makes 3D Octet® SPR sensor chips especially useful in studying non-standard antibody formats, and in the areas of small molecule and fragment research.

Octet® SPR Sensor Chip			Applications						
Octet® SPR Sensor Chip	**Product Number**	**Capacity**	**Small Molecules**	**Intermediate Molecules**	**Large Molecules**	**Kinetics**	**Affinity**	**Screening**	**LMW Binding**
Octet® SPR Maintenance Chip	19-0136	None	Instrument Maintenance						
Octet® SPR COOH1 Sensor Chip	19-0053	Low		■	■	■			
Octet® SPR CDL Sensor Chip	19-0127	Medium		■	■	■			
Octet® SPR CDH Sensor Chip	19-0128	High	■	■	■	■	■	■	■
Octet® SPR PCH Sensor Chip	19-0129	High+	■					■	■
Octet® SPR HisCap Sensor Chip	19-0058	High	■	■	■	■	■	■	■
Octet® SPR SADH Sensor Chip	19-0130	Medium to High		■	■	■	■		■



Covalent Coupling Sensor Chips

Octet® SPR CDL Sensor Chips

A thin, 3D low density carboxymethylated dextran matrix allows a highly stable covalent bond with the ligand to be generated. The short dextran chains minimize the space between the surface and the target molecule to improve sensitivity and reduce non-specific binding (Figure 2).

Biocompatible with a wide variety of target molecules such as whole cells, virus particles, large proteins and complexes, and carbohydrates.

Features and Benefits

Capacity and Surface
- Medium binding capacity
- Covalent coupling
- Matrix length from gold surface: 50 nm
- Short dextran matrix
- Minimal distance between analyte and planar surface results in a highly sensitive interaction

Analytes and Ligands
- Intermediate (>1 kDa) to large (>25 kDa) molecules
- Can be used for whole cell or virus particle work
- Useful for protein-protein or large analytes
- Affinity ligands can be immobilized to create additional capture chemistries

Octet® SPR CDH Sensor Chips

Suitable for almost all Octet® SPR assays, the Octet® SPR CDH sensor chip is comprised of a 3D carboxymethylated dextran matrix sensor chip surface. Molecules of interest can be covalently bound to the surface using a range of different amine, aldehyde, thiol or carboxyl functional chemical groups.

The Octet® SPR CDH sensor chip is one of the most widely used Octet® SPR sensor chips due to its versatility and high binding capacity, making it suitable for many diverse applications from small fragment research to large, complex molecular structures (Figure 3).

Features and Benefits

Capacity and Surface
- High binding capacity
- Produces a highly stable covalent bond
- Matrix length from gold surface: 150 nm

Analytes and Ligands
- Small molecules: fragments and organic compounds
- Large molecules, viruses and proteins
- Target interactions with low binding activity
- Biocompatible with a wide range of molecules
- pH: highly efficient capture over a wide range

Features and Benefits

Capacity and Surface
- Low binding capacity
- Covalent coupling
- Matrix length from gold surface: ~2 nm
- Minimal distance between analyte and planar surface results in highly sensitive interactions

Analytes and Ligands
- Useful for large molecular weight analytes due to its matrix-free surface
- Can be used for whole cell, virus particle, multivalent or large analyte assays
- Reduced avidity when using multivalent analytes
- Suitable for attaching molecular complexes or particles
- Immobilize affinity ligands to create additional capture chemistries

Octet® SPR COOH1 Sensor Chips

The Octet® SPR COOH1 sensor chip is comprised of a 2D planar, carboxylated oligoethylene oxide surface which can be used to create a highly stable covalent bond between the sensor chip and desired ligand.

The lack of 3D matrix results in a low binding capacity which allows interactions to take place closer to the sensor chip surface. The potential for non-specific binding to positively charged analytes is decreased due to the lack of a carboxymethylated dextran matrix. These sensor chips can be also be used if interactions are affected by the presence of either lectin or dextran.

Features and Benefits

Capacity and Surface
- Highest capacity surface of all Octet® SPR sensor chips
- Matrix length from gold surface: 150 nm

Analytes and Ligands
- Useful for small molecules, such as fragments, organic molecules and low molecular weight compounds
- Can be used in experimental conditions not favourable to dextran polycarbonate surfaces
- pH: highly efficient capture over a wide range
- High signal to noise ratio facilitates optimal small molecule screening

Octet® SPR PCH Sensor Chips

With similar properties to the Octet® SPR CDH sensor chip, the Octet® SPR PCH sensor chip has a greater degree of surface carboxylation and a denser matrix, resulting in a significantly higher binding capacity. Comprised of a non-dextran polycarboxylate hydrogel surface, it provides an alternative to dextran-based sensor chips.

This makes it ideal for small molecule, fragment and low molecular weight research, as well as experimentation involving low analyte concentrations or unfavourable immobilization conditions.

Affinity Capture Sensor Chips

Octet® SPR Streptavidin Sensor Chips

The interaction between streptavidin and biotin results in a high affinity biomolecular interaction with negligible dissociation of the ligand from the sensor chip surface, making it an ideal choice for high-capacity, reproducible SPR experimentation.

The Octet® SPR SADH sensor chip consists of streptavidin pre-immobilized on a 3D carboxymethylated dextran hydrogel, which allows binding to a variety of chemically or enzymatically biotinylated target ligands (Figure 4). Due to the highly efficient binding between the immobilized streptavidin and the biotin tagged ligand, only low nanomolar concentrations of the ligand are usually required.

Features and Benefits

Capacity and Surface
- Medium to high binding capacity
- Senor chip surface has a lower electrostatic charge compared to amine sensors
- Binding resistant to a wide range of conditions including heat, pH and proteolysis

Analytes and Ligands
- Intermediate (>1 kDa) to large (>25 kDa) molecules
- Validated for a broad range of applications
- Controlled ligand orientation facilitates optimal analyte capture with low interference of the target ligand
- pH: highly efficient capture over a wide range

Octet® SPR HisCap Sensor Chips

The Octet® SPR HisCap sensor chip consists of pre-immobilized nitrilotriacetic acid (NTA) within a non-dextran polysaccharide 3D surface, which can be used for affinity capture coupling (Figure 5).

In comparison to the strong interaction between streptavidin and biotin, the lower bond strength observed between NTA and a His-tag allows the easy removal of His-tagged ligand proteins and the regeneration of sensor chip surfaces using a variety of conditions, including imidazole, SDS and EDTA.

Features and Benefits

Capacity and Surface
- High binding capacity

Analytes and Ligands
- Suitable alternative for proteins not amenable to amine coupling
- Small molecule, peptide or fragment kinetics
- Large molecule kinetic assays
- pH: highly efficient capture over a wide range
- Stable baseline for accurate kinetic analysis

Figure 2
Octet® SPR CDL sensor chips are ideal for low capacity reproducible immobilizations. Here, streptavidin was immobilized using amine coupling to approximately 500 RU.

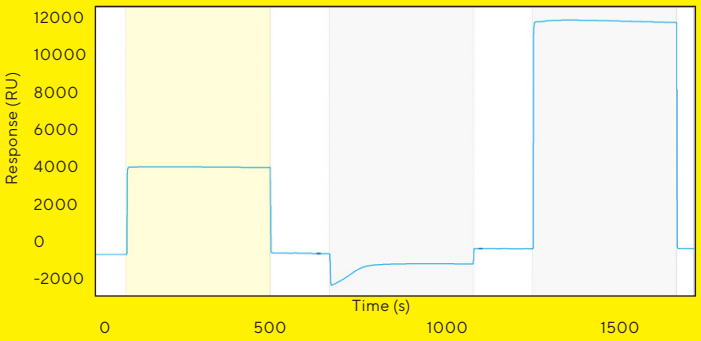


Figure 3
Octet® SPR CDH sensor chips contain a high-capacity carboxymethylated dextran matrix sensor chip surface, which allows higher immobilization levels. Here, Carbonic Anhydrase II was immobilized to two different densities of approximately 5000 and 7500 RU.

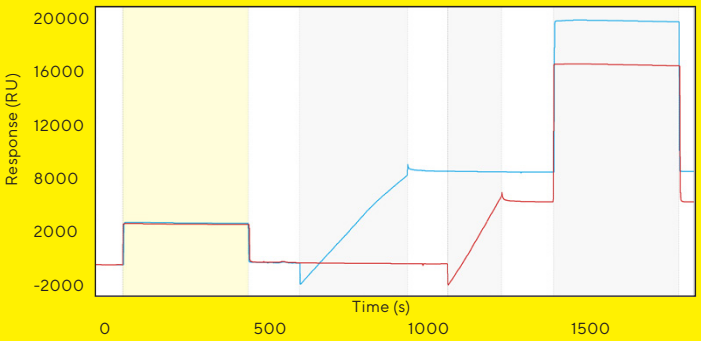


Figure 4
Pre-immobilized streptavidin on the Octet® SPR SADH sensor chip allows stable capture of biotinylated molecules. Here, biotinylated HER2 was captured at three increasing densities.

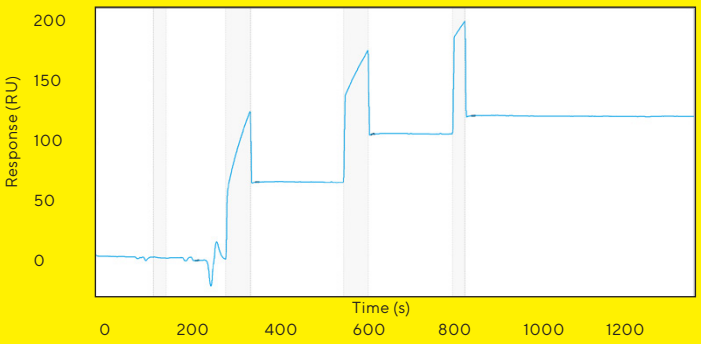
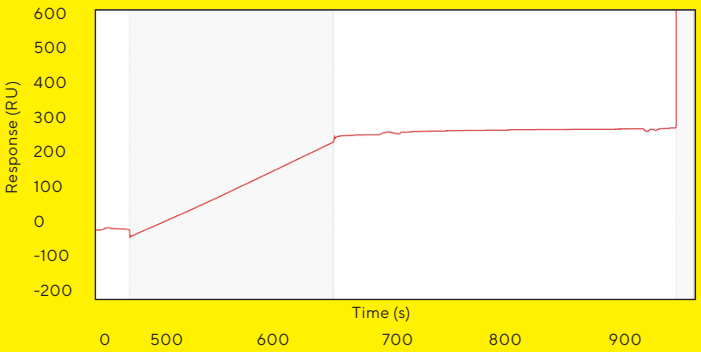


Figure 5
Octet® SPR HisCap sensor chips are ideal for stable capture of his-tagged proteins. Minimal drift ensures improved accuracy in data collection whilst retaining the ability to easily regenerate the ligand molecule.



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