



White Paper 3

Benchmarking Reichert SPR Capture Sensor Chips

Purpose: To benchmark Reichert Surface Plasmon Resonance (SPR) sensor chips based on loading capacity of proteins for capture experiments. Capture experiments are where proteins are non-covalently captured to a SPR sensor chip surface via a label or tag. Reichert sells two to three subtypes of chips that have each tag that users could employ. This white paper can be used as a guide to determine which subtype of sensor chip would be the appropriate choice for an experiment.

Procedure: Capture sensor chips were prepared from Reichert base chips per internally published Work Instructions. Generally, either a planar sensor chip (Reichert P/N 13206061) or a dextran sensor chip (Reichert P/N 13206066) was used as the base chip, and the capture surfaces were prepared via amine coupling. After each chip was prepared, they were sealed and stored under nitrogen and refrigerated until use. Each category of sensor chip was benchmarked by testing the sensor chips on a Reichert SPR instrument by injecting protein solutions designed to maximize response. The same concentration and type of protein was captured within each category type so that relative results could be compared.

Types of sensor chips prepared:

- 1) Avidin Biotin capture chips:
 - (a) Reichert P/N 13206065 NeutrAvidin
 - (b) Reichert P/N 13206070 Streptavidin planar
 - (c) Reichert P/N 13206071 Streptavidin dextran

Testing involved injecting a 200 µg/mL solution of biotinylated bovine serum albumin over the surface of each sensor chip for 4 minutes and recording the maximum response (in µRIU). Results obtained are an average of multiple values.

- 2) Ni-NTA His Tag Capture Chips:
 - (a) Reichert P/N 13206063 Planar Ni-NTA
 - (b) Reichert P/N 13206072 High-Capacity Ni-NTA (made by Xantec Bioanalytics)

Testing involved injecting a solution of His-tagged VraS protein over the surface at a concentration of 200 µg/mL for 6 minutes and recording the maximum response (in µRIU). Results obtained are an average of multiple values.

- 3) Protein A IgG Capture Chips:
 - (a) P/N 13206069 Planar Protein A
 - (b) P/N 13206073 Dextran Protein A

Testing involved injecting a solution of Bovine IgG at a concentration of 200 µg/mL over the surface of each sensor chip for 4 minutes and recording the maximum response (in µRIU). Results obtained are the average of multiple values.

Results:

- 1) Avidin Biotin Capture Chips
Relative ranking (highest to lowest): Streptavidin Dextran > NeutrAvidin Planar > Streptavidin Planar
Relative capture amounts: Dextran 4: NeutrAvidin 3: Planar 2
- 2) Ni-NTA His Tag Capture Chips
Relative ranking: High-Capacity Ni-NTA > Planar Ni-NTA
Relative capture amounts: High-Capacity 10: Planar 1



3) Protein A IgG Capture Chips

Relative ranking of Protein A chips: Dextran Protein A > Planar Protein A

Relative capture amounts: Dextran 2: Planar 1

Conclusions:

As expected for all three categories of capture sensor chips, hydrogel or dextran sensor chips had the highest capture amounts, The largest capacity increase was seen with high-capacity Ni-NTA chips which employ a unique proprietary backbone. For both the Protein A and Streptavidin capture chips, the dextran capacity was approximately double that of the planar versions. For avidin chips, the planar NeutrAvidin chip had a 50% higher capacity than the planar streptavidin chip.

Acknowledgement:

Thank you to Carmen Lee-Bennett who carried out many of the slide preparations and experiments summarized here.