

# Streptavidin-Coated Microspheres Binding Biotinylated DNA

## Description

The streptavidin-biotin bond is one of the strongest non-covalent bonds ( $K=10^{15}/M$ ) utilized in biological separations. Streptavidin-coated microspheres provide an efficient means of capturing biotinylated PCR products, or binding biotinylated ssDNA or dsDNA for downstream applications. The following protocols were developed using 1 $\mu$ m polymer streptavidin-coated microspheres, and may be adapted for other compositions and diameters.

## Material

### Material Required

- Streptavidin-coated microspheres
- Binding/Wash Buffer: 20mM Tris pH 7.5, 1M NaCl, 1mM EDTA, 0.0005% Triton<sup>®</sup>-X 100 (520 $\mu$ l per binding reaction)
- Elution Buffer (as needed): 0.2M NaOH (150 $\mu$ l per reaction)

### Instrumentation Required

- Microcentrifuge capable of 12,000 x G
- Microcentrifuge tubes, 0.5ml-2.0ml
- Precision pipets with disposable tips to deliver 1-20 $\mu$ l and 20-200 $\mu$ l
- Adjustable vortexer (manual mixing may be used in lieu of vortexing)

## Procedure

Researchers are advised to optimize the use of particles in any application.

### Binding of Single-stranded or Double-stranded Biotinylated DNA

1. Aliquot 100 $\mu$ l streptavidin-coated microspheres into a microcentrifuge tube.
2. Wash 2 times in 100 $\mu$ l Binding/Wash Buffer by centrifuging the 1 $\mu$ m streptavidin-coated microspheres at 10K rpm for 3 minutes, and decanting the supernatant.
3. Re-suspend the microspheres in 20 $\mu$ l Binding/Wash Buffer and add 5-10 $\mu$ g biotinylated ds or ss oligonucleotide. Keep bead concentration in the range 10-50 mg/ml during the binding step.
4. Incubate 15 minutes at RT on a vortexer (Setting #1), then centrifuge and decant supernatant. (*Note:* If an adjustable vortexer is unavailable, intermittent manual mixing is advised.)
5. Remove any unbound biotinylated oligonucleotide from the streptavidin-oligo beads by washing 2 times in 100 $\mu$ l Binding/Wash Buffer.
6. Re-suspend in 100 $\mu$ l Binding/Wash Buffer. Oligo-bound microspheres are now ready for downstream applications.

### Capture of ds Biotinylated DNA/Elution of ssDNA

1. Aliquot 100 $\mu$ l streptavidin-coated microspheres into a microcentrifuge tube.
2. Wash 2 times in 100 $\mu$ l Binding/Wash Buffer by centrifuging the 1 $\mu$ m streptavidin-coated microspheres at 10K rpm for 3 minutes, and decanting the supernatant.
3. Re-suspend the microspheres in 20 $\mu$ l Binding/Wash Buffer and add 5-10 $\mu$ g biotinylated double-stranded oligonucleotide (only one strand is biotinylated). Keep bead concentration in the range 10-50 mg/ml during the binding step.
4. Incubate 15 minutes at RT on vortexer (Setting #1), then centrifuge and decant supernatant. (*Note:* If an adjustable vortexer is

unavailable, intermittent manual mixing is advised.)

5. Remove any unbound biotinylated oligonucleotide from the streptavidin-oligo microspheres by washing in 2 times in 100µl Binding/Wash Buffer.
6. To recover the single-stranded DNA, re-suspend the microspheres in 150µl 0.2M NaOH. Agitate the DNA/streptavidin microspheres for 6 minutes at RT on a vortexer or with intermittent manual mixing during the incubation time.
7. Spin and save the eluate containing non-biotinylated single-stranded oligonucleotide DNA.
8. With UV/Vis spectroscopy, read the OD 260/280 for determination of the DNA concentration of the eluted sample.

## Notes

1. Quantitation methods for the ss or ds oligonucleotide in the supernatant include absorbance readings via OD 260/280 ratios or agarose gel electrophoresis. If the oligonucleotide is labeled with a fluorochrome, flow cytometric analysis may be utilized with an appropriate Quantum™ MESF kit (Cat. #BLI822 - BLI828) to quantitate fluorescence intensity of the bound oligonucleotide on the streptavidin microspheres.
2. When binding an oligonucleotide with a fluorochrome, the incubation should be performed in a dark room or with the tube wrapped in foil to avoid photobleaching.

## Trademarks and Registered Trademarks

1. Quantum™ is a trademark of Bangs Laboratories, Inc.
2. Triton® is a registered trademark of Union Carbide Corporation.

## Storage and Stability

Store at 4°C. Freezing of particles may result in irreversible aggregation and loss of binding activity.

**This product is for research use only and is not intended for use in humans or for *in vitro* diagnostic use.**

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