

Aminosilane coating

Nexterion® Slide A+ and Slide AStar



Overview

Type of coating	Immobilization method	Typical probes	Ordering information			
			Nexterion® product	Barcode option	Item number	Slides per pack
Aminosilane 2-D surface	Ionic interaction followed by cross-linking via an additional UV or baking step	<ul style="list-style-type: none">• Long oligo-nucleotides• PCR products• BACs	Slide AStar	None	1177881	25
				Laser	1177882	25
			Slide A+	None	1064875	25
				Laser	1064877	25

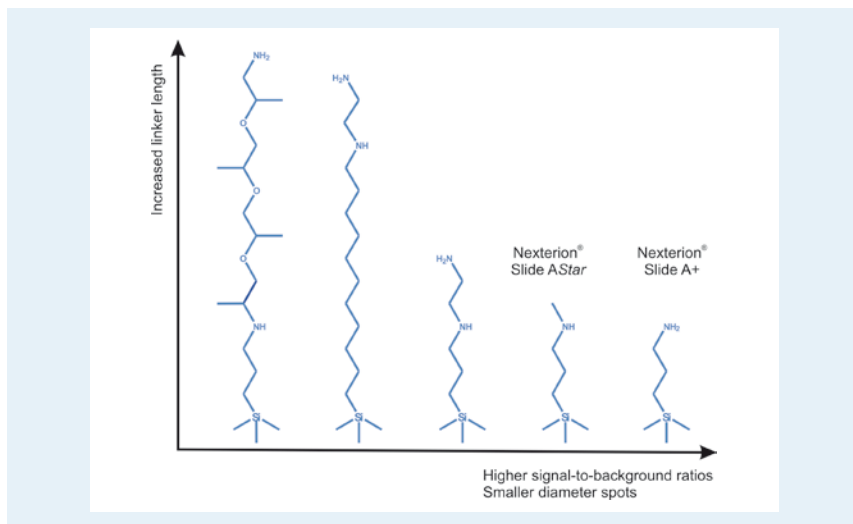
Key product features

- Printed slides have a long shelf life
- Compatible with a wide range of spotting buffers
- Coatings with uniform aminosilane density
- Regular spot uniformity and morphology

Introduction

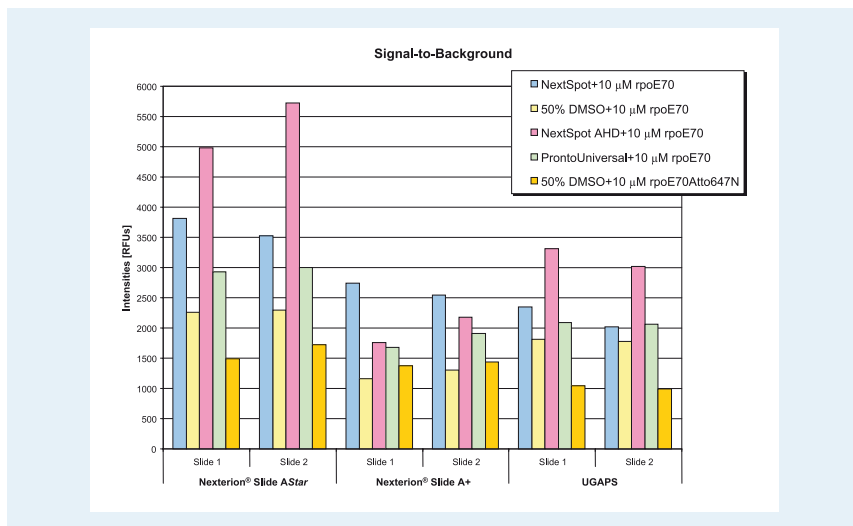
Aminosilane coated slides remain the most popular choice for printing PCR products, and long oligonucleotides, despite the emergence of innovative three-dimensional microarray surfaces, and other “active” surface chemistries such as epoxysilane. SCHOTT is committed to providing the best aminosilane microarray slides on the market, and offers two types of aminosilane slides, Nexterion® Slide A+, and Slide AStar. Aminosilane surfaces provide available amine groups for initial ionic attachment of the negatively charged phosphate groups in the DNA backbone. Conventional wisdom is that longer aminosilane molecules with multiple amino groups produce higher signal-to-background ratios, as their higher positive charge will bind more DNA to the slide surface. However, recent research at SCHOTT has shown that the situation is actually more complicated than this, and that while surfaces with a higher charge do bind more DNA, they are also more difficult to block effectively, resulting in significantly higher non-specific binding. The higher levels of non-specific binding have a negative effect leading to poorer signal-to-background ratios.

Comparison of aminosilane structures



The two aminosilane slides now offered by SCHOTT are based on very short chain aminosilanes that demonstrate high signal intensities, and exceptionally low background signals, when compared with other commercially available aminosilane slides.

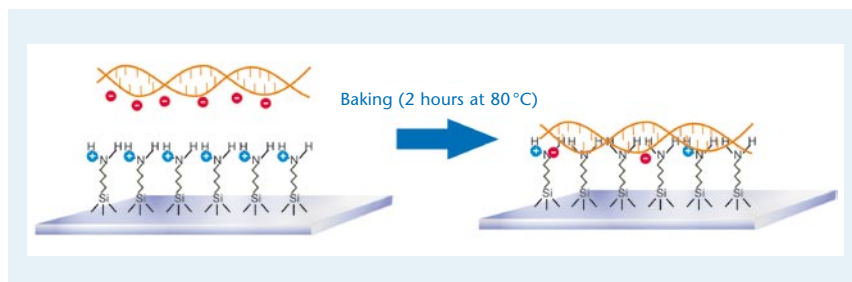
Diagram showing signal-to-background ratios compared to market leading aminosilane slide



Immobilization chemistry

Aminosilane coated slides have a high concentration of primary amino-groups available at the surface. These groups become protonated and therefore positively charged when placed in contact with a near-neutral, aqueous solution. Negatively charged probe molecules, such as DNA, will initially form multiple ionic interactions with the positively charged amino surface coating. Additional amino-modifications of the nucleic acids are not required, but such modifications do not interfere with the immobilization. After spotting, the

probes are covalently linked to the slide surface by either heating, or a brief exposure to ultraviolet (UV) light. Other types of negatively charged biomolecules may also be coupled to aminosilane surfaces.



Typical applications

- ArrayCGH
- Transcriptional profiling
- SNP genotyping
- Splice variant detection
- DNA methylation profiling

Suitable probe types

- BACs or PACs
- Oligonucleotides ≥ 40 mers
- PCR fragments
- cDNA

Product details

Reproducible results

SCHOTT slides are manufactured from a high quality, low intrinsic fluorescence borosilicate glass. The glass slides are cleaned and coated in a class 100, environmentally controlled clean room to ensure contamination and artifact free surfaces. The aminosilane coatings are applied using a unique, and innovative method developed and optimized by SCHOTT, that allows the production of large lot sizes with excellent intra-lot, and inter-lot reproducibility. Each slide lot is tested using both physical and functional quality control checks. The density of the aminosilane groups in the coatings remains uniform over the entire surface of the slides, and is optimized to maximise the DNA binding capacity. The surface hydrophobicity is tightly controlled to optimize the performance with both contact and non-contact microarray printers. The Slide A+ surface is more hydrophobic than the AStar surface, resulting in smaller spots, making it ideally suited for printing higher density arrays.

Nexterion® Slide A+, and Slide AStar are compatible with the most commonly used aminosilane protocols and a wide range of spotting buffers. This makes it easy to evaluate and switch to the Nexterion® aminosilane slides from competitor slides.

Selecting the most suitable Nexterion® aminosilane coating

Choosing the best SCHOTT aminosilane slide for the application depends on a number of factors. One important factor is the buffer used for printing the arrays. SCHOTT has developed a printing buffer system (Nexterion® Spot A HD – see “Reagents & kits” section) for printing high-density arrays of up to 50k spots on the SCHOTT aminosilane slides. The buffer system is designed to minimize sample evaporation during long print runs.

	Nexterion® Slide A+	Nexterion® Slide AStar
Compatible print buffers	<ul style="list-style-type: none"> • Nexterion® Spot A HD • Nexterion® Spot • 3x SSC • 3x SSC containing 1.5 M betaine • 25–50% DMSO • Pronto!™ Universal Spotting Solution 	<ul style="list-style-type: none"> • Nexterion® Spot A HD • Nexterion® Spot • 25–50% DMSO • Pronto!™ Universal Spotting Solution
Spot diameter	80 µm (Nexterion® Spot A HD)	90 µm (Nexterion® Spot A HD)
High hydrophobicity	✓ ✓ ✓	✓ ✓
Suitable for high density applications	✓ ✓ ✓	✓ ✓
High signal yield	✓ ✓ ✓	✓ ✓ ✓
Low non-specific binding	✓ ✓	✓ ✓ ✓
High signal to noise	✓ ✓ ✓	✓ ✓ ✓ ✓

Packaging and storage

Nexterion® Slide AStar and A+ are packaged in specially developed compatible plastic boxes, and sealed under an inert atmosphere, to ensure the substrates have a long and stable shelf life. The slides are ready-to-use from the box, and are stable for up to 12 months when stored at room temperature in the sealed packaging.

Format

Nexterion® Slide AStar and A+ are available in packs of 25-slides with optional code 128 barcodes enabling automated sample tracking. The AStar and A+ aminosilane coating are also available in 16-well slide and 96-well microplate formats. For further information refer to the section on “Multi-well formats”.

Protocols

Nexterion® Slide A+ and Slide AStar protocols are available on the Nexterion® web site.

Compatible reagents

Protocol step	Recommended Nexterion® products	Alternatives	Additional information
Spotting	Nexterion® Spot (1066029) Nexterion® Spot A HD (1168809)	<ul style="list-style-type: none"> • Pronto!™ Universal Spotting Solution • 25–50% DMSO • 3x SSC (A+ only) • 3x SSC containing 1.5 M betaine (A+ only) 	<p>Recommended Spotting Concentrations: Oligonucleotides 2–20 µM PCR Products 0.5–1 mg/mL</p> <p>Recommended Spotting Conditions: Constant 40–50% relative humidity at 20 to 25 °C</p>
Blocking	Nexterion® Block A Kit (100 mL 1206704, 500 mL 1206717)		
Hybridization	Nexterion® Hyb (Formamide free) (1066075) (A+ only) Nexterion® Oligo Hyb (with formamide) (1116890)	3–5x SSC + 0.1% SDS	Add competitor DNA if appropriate

Nexterion® Aminosilane Slide Processing Kit (order code: 1209008) (for 25 slides)

SCHOTT Microarray Solutions offers a kit with pre-prepared reagents for the blocking, hybridization and washing of 25 aminosilane coated slides printed with oligonucleotides.

Process step	SCHOTT product	Quantity
Blocking	Nexterion® Block A Kit	500 mL
Hybridization	Nexterion® Oligo Hyb	10 mL
Washing	Nexterion® Wash A	1000 mL
	Nexterion® Wash B	100 mL

Important information about patents

Using arrays based on SCHOTT Nexterion® products for dual color analysis on a single array in which at least two different samples are labeled with at least two different labels may require a license under one of the following patents: U.S. patent nos. 5,770,358 or 5,800,992 or 6,225,625 and U.S. patent no. 5,830,645. Manufacturing and use of probe arrays may require a license under the following patents: U.S. patent no. 6,040,138 or 5,445,934 or 5,744,305 and under the following patents owned by Oxford Gene Technology Ltd. ("OGT"): European patent no. EP 0,373,203, U.S. patent nos. 5,700,637 and 6,054,270 and Japanese patent nos. 3393528 and 3386391 ("The OGT patents"). Other patents may apply. The purchase of SCHOTT Nexterion® products does not convey any license under any of the OGT patents or any of the other patents referred to. For all applications SCHOTT North America Inc. and SCHOTT Technical Glass Solutions GmbH make no representation or warranty that the practice of its technology and products or any improvement will not infringe or violate any domestic or foreign patent of any third party. Before making or using any oligonucleotide arrays you should contact OGT to discuss a licence. To inquire about licensing under the OGT patents, please contact OGT at licensing@ogt.co.uk.

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