

# microarray solutions

THE NEXTERION® NEWSLETTER



SCHOTT  
glass made of ideas

Edition #5 | May 2009

Editorial . . . . .	2
“Meet the Microarray Solutions Team” Profile . . . . .	3
OEM Coated Coverslips for NanoString Technologies . . . . .	4-5
Pathogen Detection and Profiling on Nexterion® Slides . . . . .	6-7
SCHOTT News . . . . .	8
Conference and Trade Show Calendar . . . . .	8
Reader Competition . . . . .	8

Microarray Solutions  
**SCHOTT North America Inc.**  
5530 Shepherdsville Road  
Louisville, KY 40228  
USA  
Phone: +1- 502-657-4417  
Fax: +1- 502-966-4976  
E-Mail: [coatedsubstrate@us.schott.com](mailto:coatedsubstrate@us.schott.com)  
[www.us.schott.com/nexterion](http://www.us.schott.com/nexterion)

## Editorial



Christian Jabschinsky  
General Manager  
SCHOTT Microarray Solutions

Dear Reader,

This year sees SCHOTT celebrating its 125<sup>th</sup> anniversary, during all that time the company has stood for innovation, sustainability and lasting values. Back in September of 2008 when I was writing this column for the last newsletter, it was hard to imagine the global economic situation deteriorating as quickly as it has done. The SCHOTT group, with its sound financial structure, wide diversity of products, and a global presence, is well placed to ride out the economic crisis and continue as a reliable and stable partner. However, SCHOTT has started to adapt to the current economic conditions, as it has had to do during the course of its long history, and we recognize the many challenges that our Microarray Solutions customers and collaborators are now facing, with the credit crisis having a severe impact on the biotech industry's capital structure and its ability to raise funds.

Despite the severity of economic crisis, SCHOTT Microarray Solutions continues to see a very strong demand for coated and uncoated glass substrates, particularly in the United States, where our life science customers are reporting strong demand for their products and remain committed to developing new products and technologies for the future. One such company is Nanostring, a Seattle, WA based company that SCHOTT has been working closely with for the past two years. SCHOTT supplies the coated glass substrates used in NanoString's nCounter™ Analysis System. The Nexterion® coated coverslips used by Nanostring is an example of the increasing interest in the use of coated glass substrates for non-microarray applications in formats other than the standard 1" x 3" slide format. Further details about this exciting technology from NanoString can be found on pages 4 and 5.

This latest newsletter also continues on from the September edition by focusing on two more Nexterion® slide users and their interesting clinical diagnostic applications. This month features the Regional Virus Laboratory in Belfast (United Kingdom) and the Forsyth Institute in Boston, MA. As usual, we update you on the latest news from SCHOTT in our "SCHOTT Microarray Solutions News" bulletin and this month also features an interview with our Senior Application Support Scientist, Dr. Oliver Kirchner.

I hope that you enjoy reading this latest edition of "Microarray Solutions" and wish everyone a happy and successful summer.

Regards,



**Christian Jabschinsky**  
General Manager  
SCHOTT Microarray Solutions





Dr. Oliver Kirchner  
Senior Application and  
Technical Support Scientist  
SCHOTT Microarray Solutions  
Jena, Germany

Likes:  
Spending time with my young  
son, Daniel  
The working atmosphere in the  
SCHOTT team

Dislikes:  
People who have no sense of  
humour

Interests outside work:  
Digital photography, hiking,  
watching movies

## ”Meet the Microarray Solutions Team” Profile

### MS: How long have you worked for SCHOTT?

I have been part of the SCHOTT team for around 3 ½ years now. Prior to this, I held a post-doctoral position in the Institute for Genetics at Martin-Luther-University Halle-Wittenberg.

### MS: What key skills are required to do your job?

For technical support and complaint management: First, to have a strong understanding of the applications that the customer is working on, particularly as the field of applications requiring coated substrates in general, and microarrays in particular, has become extremely diverse in recent years. Secondly, knowing our products, their properties and capabilities as extensively as possible is also very important.

For R&D: Keeping up with the times, identifying trends and understanding the evolving demands of customers and transform this knowledge into the development of future products. I am also involved in looking at ways to improve and further stabilize our production processes.

### MS: What are the most important aspects of technical support?

To enable the customer to obtain the best possible results with our products and also to find a balance between an optimal performance and cost effective production.

### MS: What part of the job do you find most satisfying?

Without doubt working with customers to find satisfactory solutions to their problems. Troubleshooting is a big part of my job and it feels good to help customers achieve their desired results through my support and the use of SCHOTT products. I also enjoy resolving internal problems as part of a team, e.g. with production, as the team ethic at SCHOTT is very strong and we are very effective at solving problems quickly and efficiently.

### MS: What new projects have you worked on recently?

I have recently been involved in optimizing production processes for our DNA coatings as part of an R&D program to continuously improve the quality of our slide surfaces and scale-up production capabilities to offer larger batch sizes. In addition, I have been working on the production processes for our HiSens optical interference coating and evaluating different glass types to assess their suitability for different coatings.

### MS: From an R&D standpoint, what are the main challenges facing SCHOTT at present?

I think at the moment the main challenge for all companies worldwide is to deal with the current economic crisis. In response, we have been working hard to reduce production costs, improve yields and streamline R&D work without having a negative impact on the business. As a general point, SCHOTT Microarray Solutions has had to become increasingly flexible in accommodating customer requests for custom products for new applications. I can also see co-operations with other companies to develop new products becoming increasingly important for SCHOTT.

### MS: What are the key trends you have noticed in the microarray world since you joined SCHOTT?

Certainly in the past 12 months we have seen a significant trend towards highly specialized, custom products, i.e. glass in different formats, thicknesses, custom coatings etc. There has also been a significant increase in enquiries from customers looking to use our substrates for diagnostic applications, seeking high volumes of coated glass with economical pricing. The continued growth of the protein array market is another trend that we have been addressing for some time at SCHOTT and this will remain a focus for the future.

SCHOTT R&D has had to evolve very quickly to address these trends. For custom products, we have worked hard to increase our capabilities in-house and have also established partnerships with other companies to address certain customer needs. We are now regularly providing glass in cover slip formats, for example, so the handling of such thin pieces of glass when applying coatings and then shipping the glass required some efforts in R&D. To provide solutions for the diagnostics market, we have focused heavily on high throughput production methods and reducing material costs. And to address the needs of the protein array market, we of course developed a new nitrocellulose coated slides in conjunction with Sartorius Stedim Biotech to complement our other protein surfaces. Clearly we will be focusing our efforts in the future on surfaces for protein applications.



## OEM Coated Coverslips for NanoString Technologies

### SCHOTT Coated Coverslips

SCHOTT is able to offer a range of coated SCHOTT D263 coverslips in various formats:

#### Glass thickness:

Coverslip # 1  
(0.145 ± 0.015 mm)  
Coverslip # 1.5  
(0.175 ± 0.020 mm)  
Coverslip # 2  
(0.21 ± 0.020 mm)

#### Square:

20x20 mm  
24x24 mm

#### Rectangular:

24x60 mm

#### Circular:

25 mm Ø

#### Nexterion® Coatings:

AStar, A+, E, AL and P

Additional formats and OEM custom coatings are available on request. Please contact:

coatedsubstrate@us.schott.com  
for more information.

NanoString Technologies is a start-up company based in Seattle, Washington that has pioneered a complete system, the nCounter™ Analysis System that automates digital, multiplex gene expression analysis. The nCounter™ Analysis System uses a novel digital technology that enables direct multiplexed measurement of gene expression and offers high levels of sensitivity and precision, including detection of fractional fold change differences, a feature unique to this platform. The technology uses molecular barcodes and single molecule imaging to detect and count hundreds of unique transcripts in a single reaction without the need for enzymology. The system is comprised of a fully automated sample prep station, a digital analyzer, the CodeSet (molecular barcodes) and all other reagents needed to perform the analysis and is ideally suited for researchers seeking to validate gene expression signatures, working with small amounts of starting material or studying defined gene sets.

NanoString is targeting the midplex market in the space between QPCR and microarrays. *"Microarrays are great survey tools to evaluate genome wide expression, but they just are not that sensitive,"* said Lianne McLean, Chief Commercial Officer for NanoString Technologies. *"While QPCR is the most common approach to highly sensitive analysis of gene expression levels,"* he continued, *"it requires a lot of pipetting steps and labor to look at many genes per sample when each gene has to be assayed in a single separate reaction."* Countering the conventional methods, NanoString enables highly sensitive analysis of up to 576 gene targets per sample. NanoString Technologies believes the nCounter™ Analysis system will be most helpful for applications such as microarray validation, pathway analysis, biomarker validation and clinical research.

That degree of multiplexing with the high levels of sensitivity is enabling. *"We have customers who are contemplating studies they just couldn't consider before"* said Jonathan Roy, VP of Sales for NanoString Technologies, *"When you look at a typical midplex experiment of say 100 genes and 100 samples (in triplicate) you are looking at over 30,000 QPCR reactions, the same work can be accomplished in 300 reactions with the NanoString Technology. Without the need to make cDNA or PCR amplify, the workflow couldn't be any easier."*

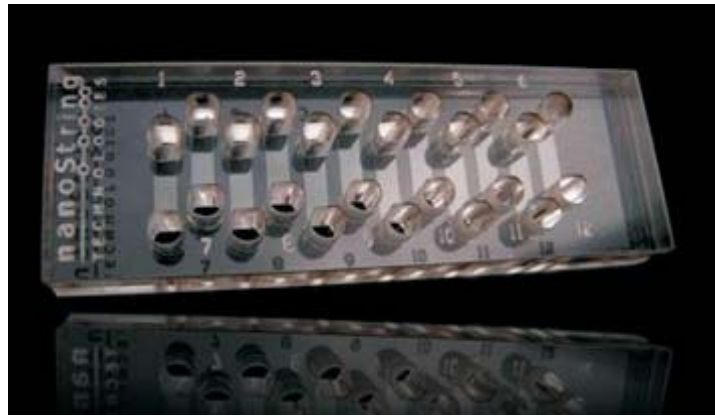


### The nCounter™ Analysis System

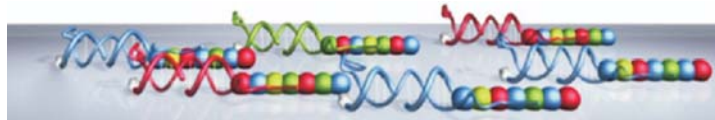
One of the unique features of the system is the coated glass substrate inside the flow cells of the sample cartridges where the binding of the hybridized target and barcode reporter probes takes place.



nCounter™ Sample Cartridge



Probe/Target complexes immobilized in the nCounter™ Sample Cartridge



Color codes on the surface of the cartridge are counted and tabulated for each target molecule.

Color Code	Counts	Identity
	3	XLSA
	2	FOX5
	1	INSULIN

During the development of the system, NanoString tested coated glass substrates from several different suppliers. NanoString had very defined requirements for the substrate, including a uniform surface with high binding capacity, low background fluorescence, and very low non-specific binding. SCHOTT was willing to work with NanoString to develop a process that met their strict performance specifications. *“One of the Nexterion coatings worked well for our technical requirements, but we needed this particular proprietary hydrogel coating applied to thin glass coverslips rather than the standard glass slide”,* said NanoString Senior Scientist Sean Ferree. *“SCHOTT was willing to work with us to develop a process that met our substrate format requirements. SCHOTT’s proven track record in manufacturing high quality coated glass surfaces and their state-of-the art manufacturing facilities make them an ideal partner for NanoString.”* NanoString obtained a license from Accelr8 Technology Corporation that enabled the use of the proprietary hydrogel coating in the nCounter™ Analysis System.

Dr. Eric Davidson, Professor of Cell Biology at the California Institute of Technology, was an early adopter of the nCounter™ Analysis system, and routinely uses the platform for his work in studying developmental biology using the sea urchin as a model. *“We have carried out extensive head-to-head comparisons between the nCounter™ System and QPCR on the same samples over the last year. nCounter™ has the distinct advantage that more data can be obtained in less time, on less starting material, without at all compromising data quality”,* said Dr. Eric Davidson. *“Highly sensitive and accurate analysis of gene expression is the fundamental data acquisition step in our developmental biology research on gene regulatory networks.”*

NanoString has recently piloted a protocol to enable gene expression analysis from cell lysates, and are working on protocols for FFPE samples and whole blood.

For more information about the nCounter™ Analysis System, please visit: [www.nanostring.com](http://www.nanostring.com)





**Facility:**  
Regional Virus Laboratory  
(RVL)

**Location:**  
Belfast, United Kingdom

**Substrate Used:**  
Nexterion® Slide E / MPX-16 /  
MTP-96

## Nexterion® Customers in Focus

### Pathogen Detection and Profiling using Nexterion® Slides

**A commonly asked question among SCHOTT customers is “What kind of applications do your other customers use Nexterion® slides for?”**

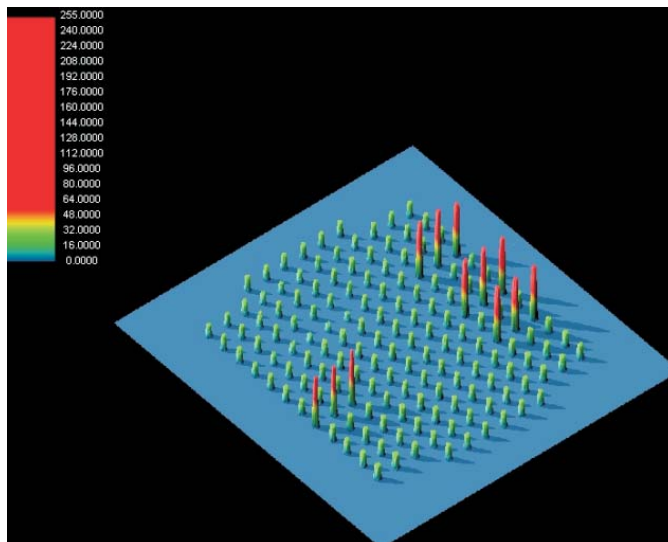
When SCHOTT first entered the microarray substrate market back in 2002, the answer was almost always for academic research, typically gene expression. We now find that the use of Nexterion® slides has moved out of R&D and into clinical applications. In this edition of “Microarray Solutions”, we focus on two such users and their microarray based diagnostic applications.

### Multi-pathogen Detection Using Nexterion® Slide E Microarray Slides

The Northern Ireland 'Regional Virus Laboratory' (RVL) is located on the Royal Hospitals site in Belfast. The RVL is part of the Belfast Health and Social Care Trust, now the largest NHS trust in the UK, and provides diagnostic services for all hospitals and general practitioners in Northern Ireland. The laboratory processes requests from over 1,600 hospital consultants and general practitioners, and completes over 40,000 molecular tests (for pathogen detection) and 80,000 serological tests (for pathogen detection and patient immunity) annually. Many of these are 'in house' tests, as the RVL has been at the forefront of developing and clinically validating new molecular diagnostic assays, and bringing these into routine NHS use.

Dr. Derek Fairley and Dr. Peter Coyle from the RVL have developed a prototype 'multipathogen' DNA microarray that can detect over 30 different viral and bacterial pathogens in respiratory specimens in a single assay. Development work has been carried out using SCHOTT's Nexterion® Slide E microarray slides, which are spotted with a series of 70mer oligonucleotide probes in Nexterion® Spot printing buffer, through a collaboration with Prof. Mike Larkin at the QUESTOR Centre (Queen's University Belfast). A BioRobotics Microgrid II spotting robot, equipped with MicroSpot 10k pins and Plate Array software (Genomic Solutions Inc., Huntingdon, UK) is used to print multiwell microarrays onto Nexterion® Slide MPX-16 (slides) and MTP-96 (96-well microtiterplate) format substrates. Target sequences from a range of bacteria, DNA viruses, and RNA viruses are amplified using multiplex PCR and RT-PCR reactions, and the products are then pooled, labeled and hybridised onto the microarrays, which effectively act as a multiplex PCR detectors. Following hybridisation and washing, the arrays are scanned using an LS200 confocal laser scanner (Tecan Group Ltd., Grödig, Austria) and image analysis is performed using ArrayPro Analyzer (Media Cybernetics Inc.).

Dr. Fairley admits to being very impressed by the performance of the Nexterion® slides for this particular application: *“By combining the very effective DNA immobilisation and low background fluorescence of Nexterion® Slide E substrates, together with the capacity to simultaneously process multiple specimens using multi-well array formats, a highly multiplexed and cost effective assay has been developed. The combined cost of the microarray substrate, amplification, labeling and purification has been reduced to less than €2.00 per specimen.”*



Surface plot, showing simultaneous detection of multiple respiratory viruses on a single Nexterion® Slide E MPX16 subgrid. A common reference probe is spotted along with every specific probe, to allow quality control and signal normalisation for each probe spot. Signals from the Cy3 (reference) and Cy5 (detection) channels have been combined in this image.



## HOMIM Array for Detection of Bacterial Profiles from Oral Cavity Clinical Samples

# Forsyth

**Facility:**  
The Forsyth Institute

**Location:**  
Boston, MA/USA

**Web:**  
www.forsyth.org

**Substrate Used:**  
Nexterion® Slide E

Forsyth is the world's leading independent non-profit organization dedicated to scientific research and education in oral health and related biomedical science. It also collaborates with corporations on projects, which range from traditional clinical trials to specific product development, and even grant-type support for exploratory research.

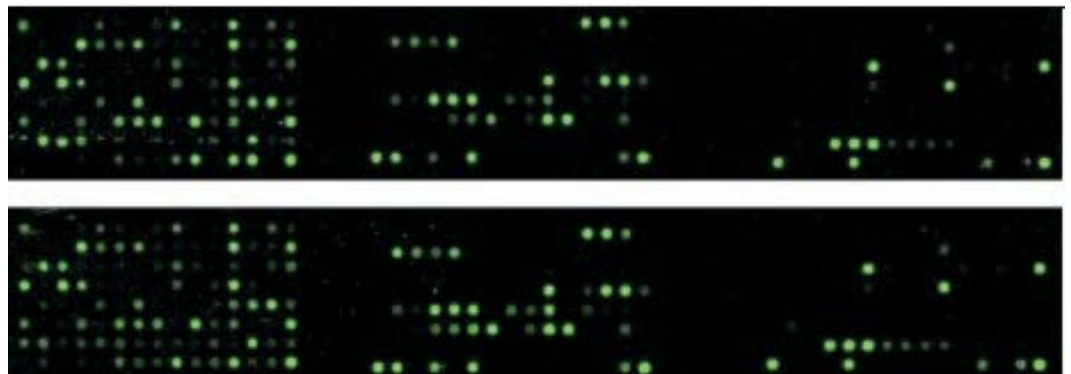
In January 2008, Forsyth Microbial Identification Microarray service (MIM) at The Forsyth Institute launched a one-of-a-kind core service to enable the rapid determination of bacterial profiles of clinical samples. The first MIM offering focuses on the detection of bacterial profiles from clinical samples from the oral cavity. Drs. Bruce Paster and Floyd Dewhirst have used molecular analyses based on 16S rRNA sequencing to identify 550 oral bacterial species, of which over half have not yet been cultivated. Using this information, they have developed the Human Oral Microbe Identification Microarray, or HOMIM, which allows the simultaneous detection of about 320 of the most prevalent oral bacterial species, including those that cannot yet be grown in vitro. The service is fully customizable and can be used to:

- ✓ Compare bacterial associations in health vs. disease
- ✓ Monitor the effects of therapy on the oral ecology
- ✓ Perform microbial perturbation studies

Susan Boches, Laboratory Technician at The Forsyth Institute, admits that SCHOTT slides have been a very reliable choice for the facility over the past 4 years through the development, optimization and now functional use of the HOMIM array as a service within the core facility. Indeed Boches is now benchmarking different SCHOTT slide surfaces in an attempt to further improve the quality of the array. She is currently in the process of testing the Nexterion® Slide E (Epoxysilane) against SCHOTT's Aldehydesilane slide, Nexterion® Slide AL. *"We chose SCHOTT slides after conducting a preliminary experiment where we printed on several different brands, and several different chemistries including Poly-L-lysine coated slides, and aldehyde slides from TeleChem"* notes Boches. *"After my assessment, it was clear that the SCHOTT slides had the lowest background signals by far - and still currently we experience background median intensity scores of <100 consistently - also the spot morphology was very consistent which we did not see with other brands."*

Identifying members of the oral microbiota has proven to have importance not only in understanding oral disease and health, but also assisting in the understanding of systemic diseases as well. Utilizing HOMIM and the generated "profiles" to understand other diseases within the body is of great importance to Forsyth, as is identifying oral indicators of disease or biomarkers. Also development of bacterial identification microarrays that target other areas of the body would be a key future development now that this technology has been optimized.

Reproducibility of the HOMIM array from Forsyth



## SCHOTT News

### SCHOTT AG receives an “Authorized Economic Operator Certificate”

In May 2009, SCHOTT received an Authorized Economic Operator (AEO) certificate that covers every SCHOTT AG site in Germany, including Jena, where all the Nexterion® products are manufactured. The AEO certificate is an internationally recognized quality mark that assures our customers that our role in the international supply chain is totally secure, and that our customs controls and security procedures are efficient and compliant. This reinforces SCHOTT's position as a secure and reliable trading partner.

### New Microarray book

Scientists at SCHOTT microarray solutions contributed a chapter entitled “The Role of Substrates in Microarray Experimentation” to a new book edited by Gary Hardiman of the University of California.

Title: Microarray Innovations; Technology and Experimentation  
 Published by Taylor & Francis / CRC Press  
 ISBN: 9781420094480

## Conference and Trade Shows

Date	Exhibition	Location
19 - 20 May 2009	Advances in Microarray Technology	Stockholm international Fairs and Congress Centre, Sweden
06 - 07 August 2009	Microarray World Congress	South San Francisco Conference Center, CA, USA

## The “Black Sheep” Competition

Nominate the “Black Sheep” of your lab and win a stylish black lab coat from Lab Armor ([www.labarmor.com](http://www.labarmor.com)) worth over 50 US Dollars. Its lightweight, durable, breathable microfiber construction is designed to keep you safe & comfortable.

Simply answer the 3 questions below, and send your entry to arrive before 12 midnight (CET) on 01 November 2009.

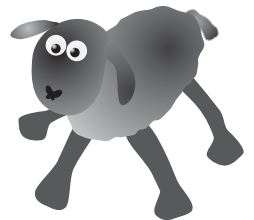
Email: [coatedsubstrate@us.schott.com](mailto:coatedsubstrate@us.schott.com)  
 Fax: +1-502/966-4976

The winner will be the first correct entry drawn at random.

Name: \_\_\_\_\_

Email: \_\_\_\_\_

Institute/Company: \_\_\_\_\_



### Questions:

1. Name just one of the “Seven Wonders of Jena”

\_\_\_\_\_

2. Which slide coating does the Forsyth Institute use?

A)

Nexterion® Slide AStar

B)

Nexterion® Slide E

C)

Nexterion® Slide F

3. Which US city will host the 2009 Microarray World Congress?

A)

San Diego

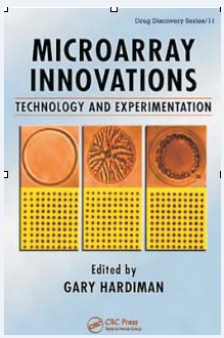
B)

South San Francisco

C)

San Jose

Only one entry per person. The judges' decision is final. This competition is void where prohibited. This competition is run and staged in accordance with German legislation.



### Winner of “Did you know?” Competition



The winner of our last competition was Barбора Pavlova, a researcher at the Veterinary Research Institute in Brno, Czech Republic.

Congratulations Barбора and enjoy your new iPod!

