microarray
instrumentation,
products & services
2013 / 2014
Ron Davis and I were studying plant transcription factors in 1990, but progress was slow and arduous because the gene expression tools were so primitive. We conceived of the DNA microarray in 1993 to speed up gene expression analysis by combining biology and high technology. We adapted Affymetrix VLSIPS technology to synthesize yeast microarrays, and measured gene expression in yeast cells by hybridizing fluorescent probes derived from mRNA. The image shows the very first microarray experiment, with colored locations on the microarray providing readouts of expressed yeast genes. We worked frantically to improve the technology, and generated the first quantitative DNA microarray data using robotically printed plant cDNAs amplified by PCR. *Science* magazine kindly published our work (M. Schena et al., “Quantitative monitoring of gene expression patterns with a complementary DNA microarray,” *Science*, 270:467–70, 1995), and since then the technology has exploded.”

—Mark Schena
The Microarray Family Tree places Arrayit President, Dr. Mark Schena in first and second position. He created the first array and continues to create new products and methods. Now 800,000 papers build on his original work.

This historiograph is a chronological linkage map that visualizes the genealogy of the microarray literature. Starting with Patrick Brown’s group in 1995⁸ (Also, see Foundations, page 18) it progresses to analysis, review and implementation in the ensuing years. The 13 key papers are identified through their citation links. Most have been cited highly in the literature and heavily referenced by a group of roughly 3,000 papers with the word “microarray” appearing in the title.

To see the data for this and other charts, visit: http://garfield.library.upenn.edu/histcomp/index-microarray.html
For a guide to reading historiograph data, visit: http://garfield.library.upenn.edu/histcomp/guide.html
Microarray Manufacturing Services for the highest quality custom microarrays available. Expert sample preparation, meticulous handling, data tracking and the highest specification precision manufacturing - all in class 100 cleanrooms with state-of-the-art robotics and complete quality control and quality assurance. Performed confidentially under strict NDA.

Manufactured Chip Specifications
- Any sequence, any biomolecule, any application
- Robotics with ± 0.5 μm positional accuracy
- Arrayit’s patented printing technology (U.S. 6,101,946)
- Triplicate spotting assures high data precision and low CVs
- Proprietary, covalent coupling chemistries - stable to 100°C
- Use Arrayit Microarray Substrates or customer provided slides
- Arrayit substrates are polished, atomically smooth glass surfaces
- Barcoding allows automated chip identification
- Substrates can include plates, micro-fluidic chips and custom formats
- Manufactured in state-of-the-art class 100 cleanrooms - designed and custom built for microarrays
- Small reaction volumes (1-100 μl) speed kinetics, maximize signals
- Wide range of basic and Clinical research applications
- Develop new assays, discover, patent and publish results

Flex Chips
Provide any sample and Arrayit prints microarrays
- Customer provides samples in 384 well microplates.
- Microarrays of cDNAs, oligos, PNAs, small molecules, peptides, receptors carbohydrates, BACS, proteins and other sample types
- Rapid turnaround time of 1-2 weeks

Oligo Design Directive
- Oligos map uniquely to the 3' end
- Sequence repeats and long stretches of poly A, G, C and T, are avoided
- Melting temperatures of the oligos are matched within a selected range

Oligo & Peptide Synthesis
Arrayit provides professional oligonucleotides and peptides.
- Premium oligonucleotides & peptides
- Quantification establishes concentration
- Arrayit coordinates time line
- Arrayit protocol for handling and shipping samples

For pricing and quote email arrayit@arrayit.com

arrayit.com (408) 744-1331 USA
NEW!

SpotBot® Titan High-Density Microarray Printing Robot


Titan Microarrays are highly recommended for research laboratories and core facilities requiring high-throughput printing capabilities. Constructed from space-age alloys and utilizing Arrayit’s patented printing technology, these systems offer high-speed and user-friendly microarray manufacturing at an affordable price.

System Features:
- Holds 136 substrates and 8 pre-prints (25 x 76 mm)
- Three 384-well microplates
- 48 microarray pins
- Professional printhead
- Repeatability of ±5 μm
- 250,000+ spots per substrate
- Megasonic pin cleaning
- Forced-air pin drying
- Humidity control of 10-80% RH
- Humidity maintained at ±1%

SpotBot® Titan Microarray Robot...........#SBT

SpotBot® Titan Protein Edition Microarray Robot (deck cooling from ambient to 4°C).............#SBTPRO

arrayit.com  (408) 744-1331 USA
**SpotBot® Extreme**

Microarray Spotters are the perfect microarrayers for research laboratories and core facilities seeking greater speed and throughput while maintaining compactness, portability and affordability. Print 10,000 samples onto 28 substrates in 12 hours!

SpotBot® Extreme is fully equipped with everything needed to print microarrays including including peristaltic pump, heavy duty gantry, advanced robotic micro-motors, high-performance professional series printhead and 16 patented 946 Micro Spotting Pins®, megasonic pin cleaning, wash and dry station and intuitive easy to use graphical software.

Built on the engineering technology of SpotBot® (400 installations worldwide and 233 scientific publications), SpotBot® Extreme continues the legacy.

Features:
- Repeatability ±10µm
- 28 glass substrates
- (25 x 76 mm), optional preprints
- Single 384-well microplate capacity with manual plate changes
- Up to 5 replicates per sample
- Capable of high-density printing (50,000+ spots per substrate)

Features continued:
- Maximum printable area of 20 mm x 70 mm
- Sensors for user safety
- Compatible with Windows 2000 thru Windows 7 x64
- Compact size: 30 x 54 x 27 cm about 2 square feet!
- Weight: 11.4 Kg (24 lbs) including vacuum and peristaltic pumps

SpotBot® Extreme Microarray Robot..............#SBX
SpotBot® Extreme Microarray Robot - Protein Edition (platen cooling from ambient to 4°C)............#SBXPRO

arrayit.com (408) 744-1331 USA
SpotBot® 3 is the market’s most affordable automated personal microarrayer with over 400 installations worldwide! SpotBot® 3 prints one 384 well plate in triplicate onto 14 substrates in less than 2 hours - the perfect complement to a microarray core facility and ideal personal microarrayer.

NEW! Updates include heavy duty gantry, professional series printhead*, new software and vision system. SpotBot® 3 is equipped with everything needed to print microarrays, including peristaltic pump, wash station and software. Options include megasonic wash station and platen cooling and heating.

Microarrays printed with the SpotBot® 3 are compatible with all microarray detection platforms using standard (25 x 76 mm) glass substrate slides.

Features:
- Repeatability ±10μm
- 14 glass substrates
  - (25 x 76 mm), optional preprints
- Single 384-well microplate capacity with manual plate changes
- Up to 5 replicates per sample
- Capable of high-density printing
  - (50,000+ spots per substrate)

Features (cont):
- Maximum printable area of 20 x 70 mm
- Sensors for user safety
- Compatible with Windows XP and 7
- Compact size: 22 x 30 x 30 cm (only about 1 square foot)
- Weight: 6.4 Kg (14 lbs) including vacuum and peristaltic pumps
- BioBlue Mini Computer,
  - LED display, keyboard and mouse

SpotBot® 3 Personal Microarray Robot..........#SPA3
SpotBot® 3 Personal Microarray Robot - Protein Edition..........#SPA3PRO

arrayit.com  (408) 744-1331 USA
NanoPrint™ Microarrayers are the market’s most advanced enterprise level systems for research and diagnostic microarray manufacturing.

NanoPrint™ Microarrayers print sub-nanoliter volumes and move in 500 nanometer steps. Sophisticated Warp1 controllers and linear drive technology on all three axes combine to afford sub-micron positional control on the entire line of NanoPrint™ Microarrayers. Systems are available in 60 and 210 substrate slide configurations - using patented Arrayit high throughput Professional, 946 and 192 Pin Printing Devices. Options include microplate stacker, environmental control and and custom platens to accommodate any substrate format.

Features include:
User and version control management
Auto calibration of substrate and microplate positions
Complete sample tracking software
Support of input / output data files
Custom microarray and automatic method validation
Speed profiles and wash protocols
Runtime sample, spotting views, simulation mode
Easy to use graphical re-print wizard

Linear servo motors provide:
Nanometer scale positional movement
Quiet operation, no vibration
Low heat generation, no motor dust
Superior accuracy, low maintenance
High load capacity
High user safety

NanoPrint™ 60...................#LM60
NanoPrint™ 60 Protein Edition......#LM60PRO
NanoPrint™ 210............................#LM210
NanoPrint™ 210 Protein Edition...#LM210PRO

Pictured is a NanoPrint Pro
Print head with 192 Technology. This device holds 192 pins at 2.25 mm centers in a 8 x 24 pattern to load samples from 1536 well plates.
Patented (U.S. 6,101,946)
**INSTRUMENTS**

NEW VERSION! **SpotLight™ 2 Fluorescent Microarray Scanners**, high performance and efficiency. Uses “cool” excitation technology, sensitive deep-space imaging detectors, high numerical aperture lenses and custom filter sets to capture more signal than other microarray scanners. Excellent field uniformity and rapid scan speed. Scan 1.0 cm² regions anywhere on the glass substrate (25 x 76 mm). Perfect SpotBot®3 companion, ideal for diagnostics - affordable!

**Features:**
- “Cool” excitation
- Superior detectors
- High signal to noise ratio
- 10 micron resolution
- 16 bit data
- Low fluorescence background
- Cyanine 3 & Cyanine 5 detection

**Custom modules:**
- Fluorescein analogs
- TRITC (Rhodamine)
- APC
- Ethidium Bromide
- Alexa Fluors
- GFP

**SpotWare™ Colorimetric Microarray Scanners**, complete software and hardware solutions. Leverages alkaline phosphatase (AP) and horseradish peroxidase (HRP) labels. Works with membrane based slides, plates and microfluidics.

**Flexible:**
- High-speed colorimetric scanning
- Adjustable gain
- 5, 10, 20 and 50 μm scanning resolution
- Accommodates 12 microarray substrates
- For research and diagnostic applications

**Pin and Printhead Cleaning Kit** guarantees performance of Micro Spotting Devices. Ultrasonics and newly formulated cleaning agents remove contaminants at the atomic level.

**Microarray High-Speed Centrifuge** Remove wash buffer and dry microarray substrate slides in seconds.

**arrayit.com**  (408) 744-1331 USA
ArrayIt® InnoScan® 900 AL microarray scanners offer 0.5 µm and 1.0 µm scan resolution, the highest resolution substrate slide scanners available. Dual detection channels allow two-color scanning of an entire substrate at 1 µm resolution in minutes. Scanning resolution is adjustable from 0.05-40 µm, making the 900s ideal for all types of microarrays containing DNA, proteins, and other molecules.

Dynamic auto focusing ensures highly uniform scanning across the entire chip surface. Mapix® Software achieves real-time adjustment of scanning intensity, easy channel balancing, data quantitation and data export. This network compatible Windows and Linux system is the most compact laser scanner on the market and weighs just 17 kg.

Highly efficient algorithms provide rapid and effective feature gridding through automatic spot searching and optimal grid alignment. Compatible with content microarrays from every major open-platform provider.

Microarray Scanner
0.5 µm resolution!

Portable desktop design

ArrayIt® InnoScan® 900 AL Microarray Scanner...#900AL

Quantitation and analysis software is bundled with every scanner. Mapix® software offers microarray image analysis capabilities that are intuitive, easy to use, and combine imaging and analysis for superior performance.

arrayit.com  (408) 744-1331 USA
NEW! ArrayIt® InnoScan® 900 microarray scanners offer 0.5 μm and 1.0 μm resolution, the highest resolution substrate slide scanners on the market. Dynamic auto focusing ensures highly uniform scanning across the entire substrate surface. Dual detection channels allow two-color scanning of an entire substrate in 3 minutes. Scanning resolution is adjustable from 0.5-40 μm, making the InnoScan® 900 ideal for all types of microarrays containing DNA, proteins, and other molecules.

The InnoScan® 900AL contains a 24 substrate slide autoloader while InnoScan® 710 and 710AL are affordable 3 μm systems. InnoScan® Scanners are compatible with content microarrays from every open-platform provider.

A high-speed computer and Mapix® Software are bundled with every scanner offering microarray image analysis that is intuitive, easy to use and combines imaging and analysis for superior performance. Mapix® achieves real-time adjustment of scanning intensity, easy channel balancing, data quantitation and data export. Mapix® Software insures rapid and effective feature gridding through automatic spot searching and optimal grid alignment. These network compatible Windows and Linux systems are compact and weighs just 15 kg.

Microarray scanners with 0.5 μm and 1.0 μm resolution!

Use with Arrayit’s Ozone Free Enclosures!

ArrayIt® InnoScan® 900 Microarray Scanner...#900A

arrayit.com  (408) 744-1331 USA
SCANNERS
SpotWare™ Colorimetric

SpotWare™ Colorimetric Microarray Scanners
Complete software and hardware solutions. Leverage alkaline phosphatase (AP) and horseradish peroxidase (HRP) labels. Work with membrane based slides, plates and microfluidics.

Flexible:
- High-speed colorimetric scanning
- Adjustable gain
- 5, 10, 20 and 50 mm scanning resolution
- Accommodates 12 microarray substrate slides
- For research and screening applications

SpotWare™ scan at 5 μm resolution showing the quantitative capacity and excellent signal to noise ratio. The 16-bit TIFF data are presented in rainbow pallet for ease of viewing. Bottom row shows saturated signals with a background of 140.

125-μm microarray spot scanned at 5, 10, 20 and 50 μm resolution settings.

Software graphical user interface; scanned substrate appears in the scan window, coded to a rainbow palette for simplified viewing. Users can pre-scan the entire substrate or a specified area and enter experimental notes into a text window.

Scanner settings include the scan area coordinates (x, y), file size (MB), scan resolution (μm), scan gain (0.1-100), and a Scan button. The pre-scan intensity window indicates the scan gains and an intensity histogram coded to a rainbow palette.

SpotWare Scanners...#SPW110 and #SPW220

arrayit.com (408) 744-1331 USA
**Arrayit® Ozone & Dust Free Enclosures** All ambient air contains ozone and dust. These revolutionary systems remove ozone and dust from the ambient air to prevent the degradation of fluorescent dyes, keeping microarrays and equipment clean. These optimal working environments for microarrays that use fluorescent dyes that are sensitive to ozone concentrations greater than 5 parts per billion (5 ppb). The work environment remains ozone and dust free - even with the door open!

Ozone & Dust Free Enclosures accommodate many types of microarray processing and laboratory equipment. Shown here is a Hybridization and Scanning Platform featuring the **SpotBot Extreme, Arrayit® TrayMix™ S4 Microarray Hybridization Station, Arrayit® Tools** and **Arrayit® InnoScan® 900A**, installed inside the Ozone & Dust Free Enclosures.

Sizes available:
(HxDxL)
80 x 100 x 80 cm
80 x 100 x 100 cm
80 x 100 x 150 cm
80 x 100 x 200 cm

**Figure 1.** From an ambient concentration of 23 ppb, ozone levels in the Ozone & Dust Free Box are reduced to less than 1 ppb in 3 minutes. With the door open, ozone levels do not exceed 5 ppb. An open door allows users to perform important microarray tasks including microarray processing and scanning.

The Ozone & Dust Free Enclosure uses an air circulation loop that forces the air inside the modular enclosure through a highly efficient catalytic converter, converting ozone to oxygen. Dust and small particles are also removed using a HEPA filter located in the fan assembly. The use of a powerful catalytic monolith technology guarantees an ozone level lower than 1 ppb with the door closed and 5 ppb with the door open. Under normal atmospheric and temperature conditions, the catalyst filter should last two years. Ozone is converted with an airflow of only 1.5 m/s.

Data (right) compare two microarrays exposed to different levels of ozone prior to scanning. Improved signal to noise ratios are easily observed.

**Ozone & Dust Free Enclosure... # OFB80, OFB100, OFB150 and OFB200**

Exposed to 30 ppb ozone.
Exposed to less than 5 ppb ozone.

arrayit.com  (408) 744-1331 USA
NEW! SpotBot® HD Vision System with high-resolution digital camera, tripod and custom software interface to view and record absolute positional coordinates on the printing deck.

SpotBot® 3 HD Vision System allows visualization of microscopic substrate elements such as 100 µm microelectrodes (see insert) using a digital camera with 10 µm spatial resolution. This unique system, when combined with a SpotBot® 3 and SpotBot® Extreme Personal Microarrayers allows direct and accurate targeted spotting onto semiconductors and other small feature sensor chips.

View and record absolute positional coordinates on the printing deck. Monitor live video from the camera and zoom to view the details. The system allows users to place the printing pin tip at precise locations - empirically. No need to develop exact mathematical models to guide the printing device. Set up and print to precise locations in real time. Verify sample deposition visually.

Vision System Software utilizes an efficient graphical-user interface that is intuitive and easy to run. It prompts and requests confirmation in dialogue boxes. Simply move the printing pin tip to the first fiducial point (using a lateral tab), calibrate the point down to 10 µm and set the X,Y and Z coordinates, then click done!

Built on the engineering technology of SpotBot® (the affordable automated personal microarrayer with over 380 installations worldwide and hundreds of scientific journal publications), SpotBot® 3 HD Vision System is used in the most advanced labs in the world.

Features:
- Easy to use software
- Accurate to ±10 µm
- Live HD video feed of substrate and pins
- Calibrate printing positions empirically

Highly recommended for:
- Aerospace
- Bioengineering
- Material science
- MEMs
- Microfluidic chips

arrayit.com (408) 744-1331 USA
Mapix® Software provides microarray image analysis that is intuitive, easy to use and combines imaging and analysis for superior performance. Mapix® achieves real-time adjustment of scanning intensity, easy channel balancing, data quantitation and data export.

Mapix® Software ensures rapid and effective feature gridding through automatic spot finding and optimal grid alignment. Complete statistical analysis including mean, median, CV, SNR and other parameters for one - and two-color microarrays.

BioBlue Computer Systems are proprietary, highly compact, high-speed computers using the latest cutting-edge technology from Silicon Valley to achieve computing speeds not obtainable with conventional commercial computers. They meet the most demanding computational needs of the microarray and life sciences communities.

BioBlue Computers and Workstations are designed to achieve silent running, stable operation temperature and the highest processing speeds available for their class and application. Assembled in Sunnyvale, California “The Heart of Silicon Valley” from commercially proven, trusted components; each BioBlue is rigorously tested, inspected for technical integrity and test run for optimum performance and durability.

BioBlue is an excellent companion to Arrayit’s Protein and DNA SpotBot® Instrumentation Line and NanoPrint™ Microarrayers, as well as Arrayit’s complete microarray scanner line.

BioBlue is upgraded on a continuous basis to reflect innovations in hardware and software components. BioBlue offers ultra-high speed computing performance in a compact design with convenient connectivity.

BioBlue Bioinformatics Computer System...#BBC
Arrayit® envisioned the need for microarray products in 1995. Since then, Arrayit® has introduced more than 1200 products into the marketplace including advanced hybridization stations for all microarray laboratories.

**Array Plate Microarray Hybridization Stations** (left) permit automated time, temperature and mixing control of 4x16 and 4x24 Multi-Well Hybridization Cassettes. Hybridize and incubate 96 DNA, protein, peptide or carbohydrate microarrays at a time using digital and Peltier control. Supports many other applications including cell studies, transcription, immunoprecipitation, enzyme kinetics, and other hardware types including microplates and single tubes.

Designed and developed to rapidly and efficiently hybridize and/or incubate DNA, protein, carbohydrate and peptide microarrays.

**Features**
- Easy-to-use digital interface
- Track operations on high-luminosity 3-color digital display
- Versatile block accommodates microplates and single tubes
- Compatible with microplate hardware AHC4X16 and AHC4X24
- Temperature range: ambient to 100°C
- Timer range: 1 min to 100 hr
- Mixing speed: 300-1,500 RPM
- 10 min ramp time from 20°C to 100°C
- Dimensions (L x W x H): 32.5 x 26.5 x 17.0 cm (12.8 x 10.4 x 6.7 in)
- Weight: 8.5 kg (18.7 lbs)

Array Plate Multi-Well Microarray Hybridization Station...#MMHS110V

**Multi-Well Hybridization Cassettes** (below) use silicon gaskets to create 96 - 7.5 x 6.5 mm wells in four 3x8 patterns at 9 mm centers and microplate foil seals to eliminate sample evaporation.

Accommodates four substrate slides.

Hybridization Cassette, 4x24...#AHC4x24

**Arrayit TrayMix™ S4 Automated Hybridization Station**

Micro-mixing systems based on patented chaotic advection for microarray hybridization.

Superior results are obtained by homogeneous dispersion of molecules throughout the computer controlled 21 x 60 mm chemically resistant hybridization area.

TrayMix™ S4 significantly reduces hybridization times while offering reproducible and robust results from one experiment to the next using as little as 5 pmole of biological probe. Achieve greater hybridization specificity while reducing coefficients of variation. Enhance gene expression, detection of mutations, microarray comparative genomic hybridization, genotyping, FISH, and more.

NEW! Smaller reaction volumes.

Arrayit TrayMix™ S4 Automated Hybridization Station...#TMHS

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arrayit.com  (408) 744-1331 USA
Hybridization Cassette: designed to facilitate coverslip biochemical reactions of DNA, protein and peptide microarrays. Accommodate 25 x 76 mm substrates.

Microarray Hybridization Cassette
1x24, 1x16, 4x24, 4x16
The AHC1X24 (right) has a well size of 7.5 mm x 6.5 mm for 75-100 ml reaction volumes. The 3 x 8 format with 9 mm center-to-center well spacing enables loading by multi-channel pipettes or automated robots. Hybridization Cassette...#AHC1X24

24 Well Hybridization Cassette (below) allows submersible temperature controlled reactions without sample evaporation.

Six colors available, all suitable for use in 0-100°C. No tools required. Ruby, Citrine, Peridot, Topaz, Amethyst, and Black..................#AHC

High Throughput Wash Station, for 25 microarray slides, work with aqueous based buffers and any magnetic stir plate. High Throughput Wash Station...#HTW

24 Well Features
- Multiplexed 24 well format
- 9 mm center to center spacing
- Reaction volume 50 µl per well
- Pristine reaction environment
- Durable gasket can be reused many times

24 Well Multiplexed Hybridization Cassette...#RC1X24

arrayit.com (408) 744-1331 USA
Dr. Schena first introduced the use of microarrays as diagnostic tools in July of 2000. Microarray Dx is now on pace to become the most widely used form of microarray technology! ArrayIt” created Personal Microarray Platforms to serve this important emerging market.

**Personal Microarray Platform** for microarray manufacturing, processing and analysis.

Open platform system enables the printing and scanning of microarrays containing DNA, RNA, proteins, peptides, antibodies, patient samples and other biomolecules.

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**Testimonial**

“We have built a successful Microarray Diagnostic Screening business around the SpotBot Microarray Robot and Arrayit” tools and reagents. Our microarray business is the most successful part of a very successful company. We see no limit to the number and kinds of assays we can convert to the microarray format. Thank-you ArrayIt” for making this possible with your cutting-edge, affordable products.”

J. Tallam
President, BioVend Inc.

arrayit.com  (408) 744-1331 USA
Single Tube, 96-well & 384-well PCR Purification Kits allow high-throughput purification of PCR products for DNA microarrays, sequencing, and other applications.

Using advanced membrane separation technology, these kits remove unwanted salts, enzymes, primers, unincorporated nucleotides, and other contaminants from PCR products. ArrayIt® kits increase the quality of microarray data, labeled probes and sequencing products! More affordable than competitor’s kits!

**Superior Purification Kits:**
- Reduce background and improve signal intensity
- Increase coupling efficiency
- Supports native and modified PCR products
- Work on 2D and 3D microarray surfaces
- Filter chemistry provides >99% PCR purity
- > 90% yield (versus 25-75% other brands)
- No glass fiber contamination
- Purifies 50-10,000 bp PCR products
- 0.2 mm-filtered for optimal performance
- Designed for manual or automated use

**Fluorescent Probe Purification** kits utilize proprietary separation buffers in a convenient single column kit. Works with amino allyl labeling dyes from any vendor.

Fluorescent Probe Purification, 50 Single Columns.........................#FPP
1 x 384-Well Microplate Format..............#FPP384

**Dye Terminator Clean Up** Kits 1 x 96 and 1 x 384-Well Microplate Format. For high throughput DNA sequencing!
96-Well Kit...#DTC96
384-Well Kit...#DTC384
Arrayit Professional Series printing pins and printheads meet the most demanding needs of microarray manufacturing. Contoured printhead apertures reduce friction by 66% and tighten pin clearance to 2.5 μm for increased durability and accuracy. Professional technology is essential equipment for all professional microarray manufacturing applications including research, genomics, proteomics and diagnostics.*

Arrayit Professional Series Printhead 48 (Cat. PROPH48) with forty eight Pro Series Pins. (Cat. PRO3). Pro Printhead has ultra high-precision contoured printhead apertures and 2.5 μm printhead-pin spacing for greater durability and printing precision. The Pro Series Microarray Printing Pin features a 75 μm wide tip and a 0.25 μl sample channel. Pro Series pins are constructed from Arrayit’s proprietary RM101 alloy, which is 10- times more durable than stainless steel, ensuring 10 million printing cycles and faster printing speeds. Pin points are concentric to ±2.5 μm which allows perfect subgrid ("block") alignment and faster data analysis.

Patented PRO, 946, Stealth and ChipMaker Micro Spotting Devices are the most widely used microarray manufacturing technologies in the world. A full line of stock and custom Printheads are available to fit any robot. Micro Spotting Pins produce spot sizes ranging from 37.5-1,000 μm, depending on the tip size. Over 60 different interchangeable pin styles are available with three different loading volumes, 0.25, 0.60 and 1.25 μl - producing 200, 600 and 1,200 spots per sample uptake (See Figure 1). Custom pin loading volumes and tip styles are available by special request. Print cells with Whole Cell Microarray Printing Pins.

Micro Spotting Pins utilize a surface tension printing mechanism that relies on light contact between the pin, sample, and surface. The pins and printheads are durable for millions of printing cycles.

**Superior Design:**
Surface tension printing mechanism
Defined sample loading volume
60 different interchangeable styles
Printheads fit any robot

**Superior Performance:**
0.125, 0.25, 0.60 & 1.25 μl uptake
37.5-1,000 μm diameter spots
Up to 1,200 spots with one uptake
Durable for millions of cycles

**The Industry Standard:**
>3,950 installations worldwide
"Zero" mechanical variation
Award winning customer support
Popular line of supporting products
Used in thousands of publications

**Pricing:**
Printing Pins.................see price list
Printheads.....................see price list

*Diagnostic applications require license.
Professional, 946 and Stealth Microarray Printing Technology Printheads are available in 4, 16, 32, 48, 64 and 192 Pin configurations. Printheads accommodate the complete line of PRO, 946 and Stealth Micro Spotting Pins.

NEW! PRO Printheads are compatible with all motion control systems. Lightweight design and tighter tolerances are industry firsts! Pro Printhead (48 Pins)...#PROPH48

NEW! Professional Series Printing Technology.

PRO Pins extended collar design permits easy handling with our Pin Tool. PRO Pins are interchangeable with 946 and Stealth. PRO Pins deliver greater durability, precision and accuracy. All Pins come in sixty tip sizes with three sample loading volumes.

Custom Printheads designed for any microarray robot including Genetix, Digilab, and others. Pictured is Genetix Stealth 48 Pin...#GSPH48L

"Sticky box" packaging insures safe and pristine delivery.

Microarray 946 Printing Technology - precision, reduced weight and extended collar design.

Professional 48 Pin Printhead for NanoPrint. NanoPrint Printhead 48 Pin...#PRONPH48

Pins and printheads protected by U.S. Patent #6,101,946.

Stealth Micro Spotting Pins, sixty tip sizes, 0.25, 0.6 and 1.25μl loading volumes. Stealth Microarray Printing Pins...#SMP

Diagnostic Technology License...#MSDTL

arrayit.com  (408) 744-1331 USA
**SuperClean 2 - Premium Microarray Substrates**
Polished, atomically smooth, clean and ready for chemistry.
SuperClean 2 (Box of 25)...#SMC2
SuperClean 2 Barcoded (Box of 25)...#SMC2BC
All Substrates available Barcoded.

**NEW! Super Microarray Substrates 3 Series**
Advanced ultra-clear, ultra-transparent silicon dioxide glass surfaces possessing the highest coupling efficiency and lowest intrinsic fluorescence on the market.
SuperClean, Amine, Aldehyde and Epoxy

**SuperAmine 2 - Premium Microarray Substrates**
Electrostatic coupling of biomolecules. Very popular! Immobilize long oligonucleotides and cDNAs.
SuperAmine 2 (Box of 25)...#SMM2

**SuperStreptavidin** - streptavidin activated to bind biotinylated biomolecules.
SuperStreptavidin (Box of 25)...#SMS

**SuperAldehyde 2 - Premium Microarray Substrates**
Covalent DNA and protein coupling via primary amines. Ideal for amino modified oligos, amino modified cDNAs, proteins, cells, and tissues.
SuperAldehyde 2 (Box of 25)...#SMA2

**SuperNitro** - Immobilize various biomolecules including proteins, carbohydrates and DNA! Higher binding capacity (2 μg/mm²) than any protein microarray surface available.
SuperNitro (Box of 25)...#SMN

**SuperEpoxy 2 - Premium Microarray Substrates**
Covalent binding via amines, thiol, and hydroxyls. Immobilize amino modified and unmodified oligos and cDNAs, immobilize proteins, peptides, cells, tissues etc...
SuperEpoxy 2 (Box of 25)...#SME2

**Substrate Specifications:**
- Polished - atomically smooth glass
- Class 100 cleanroom manufacturing
- Stable reactive surfaces, clear or mirrored
- Long shelf life at room temperature
- Free of DNAses, RNAses and proteases
- Chamfer for unambiguous orientation
- Polished edges for enhanced signal strength
- Optional standard or custom barcode
- Covalent, electrostatic, hydrophobic binding
- Genomics, proteomics, diagnostics, drug discovery and other microarray applications

arrayit.com  (408) 744-1331 USA
Atomic Force Microscopy (AFM) reveals how glass polishing improves microarray spot morphology and assay precision.

Arrayit® Super Microarray Substrate Slides are homogeneous. The smooth surface enables uniform deposition of surface chemistries and superior spot morphology. AFM analysis reveals average flatness of 2.0 nm or 20 angstroms, equal to 10 silicon dioxide bonds. Arrayit® Super Microarray Substrate Slides utilize pristine, atomically smooth glass surfaces, the only polished glass substrate slides on the market.

Competing Brands conventional slide surfaces are heterogeneous. The rough surface slide surfaces results in uneven deposition of biomolecules with clustering, accretion and pooling, causing poor spot morphology. AFM analysis reveals poor surface topology. The surface shows roughness and bumps that cannot be cleaned or removed. Conventional glass slides are raw and unpolished and produce low quality data.

All Substrates are available with chemical-resistant barcodes. Custom Processes include Ink Screen, Teflon Mask, Chrome Lithography, and Laser Ablation. Create designs to 5 micron accuracy for fiducials, gaskets, alignment marks, numerals or logo artwork.

Custom Processes, request quote...#CCSL Barcoded...see price list.

Quality Control
Super Microarray Substrates are manufactured in state-of-the art class 100 cleanrooms with air, humidity, temperature and lighting controls. Rigorous monitoring of each individual substrate including confocal laser scans and contact angle testing guarantees the highest quality products!

NEW! Ask for glass and surface chemistries in custom sizes! Custom glass coverslips, microfluidic biochip devices, prisms and unique shapes. Clean or with any surface chemistry. Thickness from 0.05mm to 150mm. Ideal glass for next-generation sequencing applications.

Glass Specifications
Slide format (25 mm x 76 mm x 0.960 mm)
Smoothness (<50 angstroms over entire surface)
Refractive index of 1.52 (400 - 700 nm)
Tolerances (25 ±0.2 mm x 76±0.3 mm x 0.96±0.025 mm)
H25K Whole Human Genome Microarrays

H25K is the world's only human genome microarray based on the completely sequenced human genome and derived from a fully annotated set of 25,509 human genes. This next generation microarray represents a significant advance over competing products consisting of collections of expressed sequences tags (ESTs) from poorly annotated sequence databases.

H25K is a multi-purpose microarray containing 26,304 long oligonucleotides designed to maximize studies of the entire human genome in a single biochemical reaction. Researchers can utilize samples prepared from genomic DNA, mRNA and protein to study problems ranging from karyotyping and gene expression profiling to chromatin structure and protein-DNA interactions. For gene expression users, this revolutionary one spot-one gene™ design allows the quantitative measurement of >300,000 human transcripts in a single hybridization reaction. The most advanced bioinformatics, oligonucleotide manufacturing, microarray printing and surface chemistry provide streamlined data analysis and mining. Fully compatible with an installed base of >10,000 microarray substrate slide scanners, H25K sets a new standard for human genome microarrays.

H25K contains a single set of gene-specific identifiers capable of examining the entire human genome. It is the only whole human genome chip in the world to provide this capability.

arrayit.com (408) 744-1331 USA
Discover Chips™ enable analysis of 380 popular, well studied genes from four important organisms: Human, Mouse, Rat and Arabidopsis.

Discover Chips™ oligonucleotide microarrays contain 380 genes selected from 30 major functional groups and negative controls, providing broad coverage of physiological and transcriptional information. Highly optimized and melting temperature-matched 70-mers, printed in class 100 microarray cleanrooms produce outstanding microarray data for research, grants and other applications.

Discover Chips™ microarrays are excellent educational tools!

Human..........#DCH  
Mouse..........#DCM  
Rat...............#DCR  
Arabidopsis...#DCA

CheckIt™ Chips Kits

CheckIt™ Chips Kits include microarrays and fluorescent probes for test hybridization and quality control experiments.

Each kit contains 5 printed microarrays, 8 glass coverslips, and aliquots of Seelt™ Universal probe and Hyblt™ buffer.

Hybridize Seelt™ probe to assess hybridization efficiency. CheckIt™ Chips microarrays contain custom 70-mer oligos in b sense and antisense orientations. Easy to scan 300 μm spots are printed in duplicate as two 10 x 10 subgrids.

Great for practice experiments!

CheckIt™ Chips Kit...#CHK

arrayit.com  (408) 744-1331 USA
Arrayit® has been a microarray technology leader since 1997. As pioneers in the field, we have created the essential tools, kits, reagents, instruments, and content necessary for **protein microarray** analysis. Key components of the Arrayit® protein microarray platform are the SpotBot® and NanoPrint™ Protein Edition microarrays with cooling capabilities, protein spotting buffers, protein microarray substrates and surface chemistries, and pre-printed protein microarrays. Arrayit® also offers contract protein, peptide and small molecule microarray manufacturing through our Microarray Services Division.

Arrayit® microarray technology empowers the manufacture and analysis of many different types of protein microarrays including proteome chips. Target proteins are printed onto derivatized or membrane-coated glass substrates using patented contact printing technology (U.S. 6,101,946) and Arrayit® high-speed robots. Printed protein microarrays are processed and reacted with protein probe mixtures derived from cell lysates, serum samples or other sources. Fluorescent, colorimetric, chemiluminescence and unlabeled protein probe molecules are detected using standard microarray scanners, surface plasmon resonance, or mass spectrometry. The full gamut of protein biochemistry questions can be addressed with Arrayit® protein microarray platforms.

**Protein microarray applications include:**

- Expression profiling
- Serum diagnostics
- Protein-protein binding assays
- Drug-target binding
- Receptor-epitope binding

The inherent multiplexing and miniaturization of Arrayit® microarray technology allows the analysis of tens of thousands of proteins in a single binding step. Important assays include drug binding, structural studies, enzyme analyses, and pathway elucidation. Microarrays are excellent tools for discovering novel proteins key to understanding disease progression and safe and affordable drug development.

Pharmaceutical and biotechnology companies employ our protein microarray technology to streamline drug target identification, validation and toxicity testing.

- **Labeled lysate, serum, protein, antigen, peptide or antibody**

- **Printed lysate, serum, protein, antigen, peptide or antibody**

Recombinant proteins, antigens, antibodies, protein domains, peptides, cellular extracts and other sources of polypeptides are printed into microarrays using the SpotBot® or NanoPrint™ microarrays, and reacted with labeled probe molecules derived from any protein source capable of binding to the immobilized target proteins. An infinite variety of protein-protein assays can be devised using the "open platform" architecture of Arrayit® protein microarray systems.

arrayit.com (408) 744-1331 USA
Overview of Arrayit® Protein Microarray Services, Instrumentation, Buffers, Microarrays and Substrate Slides.

**Protein Microarray Manufacturing Services**
**Protein, Peptide, Reverse Phase and Small Molecule**
*Custom Microarray Manufacturing* compliant with FDA MicroArray Quality Control (MAQC-I, II) standards for basic and clinical research. Sample preparation, tracking and micro spotting performed in class 100 cleanrooms with advanced robotics and patented printing technology. Confidentiality assured under NDA. Pilot studies to high throughput manufacturing.
Call or email arrayit@arrayit.com for quote.

**Protein Edition Instrumentation**
**Microarray Printers, Scanners and Hybridization Stations**
*Microarray Robots* NanoPrint™, Titan, SpotBot® Extreme and SpotBot® 3 have optional deck cooling from ambient to 4°C for protein microarray printing. *Scanners* InnoScan®, ArrayPix™ and SpotLight™ are all compatible with protein microarrays. *Hybridization* instruments Array Plate and TrayMix™ Automated Hybridization Stations also support protein microarrays.

**Protein Microarray Buffer Kit**
Kit includes activation, reaction, wash and rinse buffers. Buffers are 0.1 μm-filtered, pre-mixed and ready to use. Kits are designed to increase signal strength and reduce background. Highly recommended for peptide, antibody, antigen, reverse phase and PlasmaScan™ Microarrays.
Protein Microarray Buffer Kit...#PMBK

**PlasmaScan™ Antibody Microarrays**
PlasmaScan™ 80 / PlasmaScan™ 380 antibody microarrays contain 80 and 380 (respectively) different mAbs printed on glass substrates. PlasmaScan™ are the only microarrays that contains non-redundant mAbs raised exclusively against native human plasma proteins. PlasmaScan™ antibodies recognize naturally occurring post-translational modifications and folding to allow the correct detection of glycosylation and other modifications that are highly antigenic.
Arrayit® PlasmaScan™ Antibody Microarray...#PS80 and...#PS380

**Protein Microarray Substrate Slides**
*SuperAldehyde 3, SuperEpoxy 3, SuperNitro and SuperProtein:* Glass engineered for microarrays - maintains the essential characteristics:
- polished surface
- flatness
- parallelism
- durability
- low intrinsic fluorescence.
SuperEpoxy 3 (Box of 25)...#SME3
SuperProtein (Box of 25)...#SUP

arrayit.com  (408) 744-1331 USA
NEW! Arrayit Pathways™ Focused Human Genome Microarrays enable targeted gene expression analysis of every major cellular pathway in the human body.

Content is derived from our high performance H25K human genome microarrays, which contain a complete set of 25,509 fully annotated human genes representing every gene in the human genome. Pathways™ Microarrays offer the highest sensitivity and specificity of any product on the market, empowered by genes, proprietary attachment and surface chemistry, and a unique one gene-one spot™ design.

Arrayit offers a complete line of instruments, tools, kits, reagents and software to fully support Pathways™ Microarrays experimentation.

Pathways™ Microarrays allow users to rapidly and economically explore:
- adipogenesis
- angiogenesis
- apoptosis
- cancer drug targets
- cardiotoxicity
- cell cycle
- cytokine production
- DNA repair
- glucose metabolism
- growth factors
- hypertension
- JAK/STAT
- mitochondria
- neurotoxicity
- protein phosphatases
- stem cells
- transcription factors
- WNT signalling
- and many others

See web site for gene lists

Kit Contents:
- 10 x Pathways™ Gene Expression Microarrays
- 10 x Cover Slips (18 x 18 mm)
- 1 x Pathway Gene List
- 1 x GAL File Quantification Spot Map

Pathways™ Microarrays...see web site for Cat. numbers
Arrayit OvaDx® Pre-Symptomatic Ovarian Cancer Test In Development will be the market’s first screening test for ovarian cancer. OvaDx® is an advanced microarray-based blood serum test that measures the activation of the immune system in response to early state ovarian tumor cell development.

Research studies with OvaDx® indicate high sensitivity and specificity for all types and stages of ovarian cancer including stage IA-IV borderline serous, clear cell, endometrioid, mixed epithelial, mucinous, serous, and ovarian adenocarcinoma. Serum is applied to the OvaDx® microarray to allow binding between proteomic biomarkers in the sample and approximately 100 capture agents on the microarray. The microarray is washed and scanned to produce a digital readout for each serum sample, and the data are quantified and analyzed in software to generate the test results.

Clinical Applications OvaDx® can be used to analyze different tumor types and stages, the effectiveness of chemotherapies, biomarker profiles in breast cancer and other epithelial cancers, studies of benign gynecological conditions, the effectiveness of ovarian cancer drugs for treatment and prevention, and to benchmark existing tests including CA-125, OVA1®, HE4 and transvaginal ultrasound. OvaDx® will be available upon approval by the United States Food and Durg Administration (FDA). Arrayit Corporation strictly forbids the sale or use of this diagnostic product prior to FDA approval.

Sample and Labeling Requirements:
Draw fresh blood intravenously (0.5-1.0 ml), collect in a red-top tube with no additive and centrifuge immediately for 5 min at 6,000 rpm (2,000 x g) to isolate the serum fraction (top layer). Transfer serum (0.1-0.25 ml) to a fresh microfuge tube or sample vial and freeze immediately at -20°C or -70°C. Previously prepared samples stored at -20°C or -70°C can also be used. Label each sample clearly with a permanent marker or adhesive label prior to shipping. Patient samples can also be collected using Arrayit’s new blood card technology.

Ship samples overnight on dry ice with annotation and complete investigator contact information to:

Arrayit Corporation
OvaDx® Receiving
524 East Weddell Drive,
Sunnyvale, CA 94089 USA

Test Results
Arrayit® provides a full test report with each submitted sample including benchmarks for sample integrity (pass/fail), protein concentration (pass/fail), spectrophotometric (pass/fail), assay background (pass/fail), assay uniformity (pass/fail), positive controls (pass/fail), negative controls (pass/fail), capture agents (numerical score), and test results (positive or negative). A graphical report showing the capture agent profile is available upon request for customers interested in correlating samples and capture agents.

Catalog #....OVADX
Serum Based Testing
Arrayit microarray technology and instrumentation integrate to enable various screening applications.

Mapix® Software ensures rapid feature gridding through automatic spot finding and grid alignment. Network compatible Windows and Linux systems.

Array Plate Hybridization Stations permit automated time, temperature (ambient to 100°C) and mixing (300-1,500 rpm) control of Multi-Well Hybridization Cassettes. Hybridize and incubate 96 microarrays at a time by digital and Peltier control. Available in 1, 2 and 4 plate configurations.

InnoScan® 900 AL contains a 24 substrate slide autoloader and InnoScan® 710 and 710AL are affordable 3 µm systems. InnoScan® Scanners are compatible with content microarrays from all open-platform providers.

BioBlue Computer and Mapix® Software are bundled with every scanner, offering microarray image analysis that is intuitive, easy to use and combines imaging and analysis for superior performance. Mapix® achieves real-time adjustment of scanning intensity, easy channel balancing, data quantitation and data export.

Arrayit® InnoScan® 900 AL Microarray Scanner...#900AL (shown)

arrayit.com  (408) 744-1331 USA
Arrayit Corporation possesses an important portfolio of patented, patent pending and trade secret technologies, products and methods for population wide screening and diagnostics and available for license or purchase.

**Variation Identification Platform (VIP) License** Arrayit has developed and patented (U.S. 6,913,879) multi-patient technology, a revolutionary approach for human disease screening, blood typing, parentage testing, forensics, human leukocyte antigen (HLA) analysis, and infectious disease diagnosis.

Distinct from oligonucleotide microarrays, VIP microarrays attach segments of patient DNA to the chip. Multi-patient screening methods for single nucleotide polymorphisms (SNP) and other alleles provides a parallel format allowing up to 360,000 patients and many diseases to be scored on one microarray with a single hybridization reaction.

VIP technology can be used to screen small numbers to millions of patients for genetic diseases, neonatal disorders and infectious diseases in a single test. Tests have been designed to diagnose cystic fibrosis, sickle cell anemia, and other serious diseases that are treatable by early detection.

This approach can also be used to identify disease carriers and for forensics, food safety testing, parentage testing, HLA screening, blood typing and anti-terrorism analysis. Access to VIP technology allows the licensee to develop genetic screening and diagnostic tests that are fast, highly affordable, and noninvasive.

**Multi-patient genotyping** methods can utilize DNA samples from large numbers of patients. Specific genomic segments containing disease markers are amplified by PCR and printed into microarrays - with each spot containing DNA segments from a patient. The microarrays are hybridized with fluorescent oligonucleotides representing the disease, then processed and scanned. The fluorescent signal of each spot allows assignment of normal (green), carrier (yellow) and disease (red) genotypes for each patient. This massively parallel multi-patient genotyping format allows the genotyping of tens of thousands of patients or more on a single microarray.

**DNA from multiple patients**
- Amplify
- Print microarray containing DNA from thousands of patients
- Hybridize fluorescent oligos
- Read normal, carrier and disease

Determine genotypes for multiple patients at once

Figure 1. One embodiment of VIP methods.

**Arrayit Blood Card** technology offers an advanced card-based whole blood collection method that collects, separates and stores whole blood components for a wide range of research use only applications.
NEW! Arrayit Diagnostics Parkinson’s Disease Microarray™ Arrayit has leveraged the company’s patented and proprietary microarray discovery platform to decipher the molecular basis of Parkinson’s Disease (PD). This important research project offers exciting promise for the pre-symptomatic and post-symptomatic diagnosis and treatment of this serious neurodegenerative condition.

Rationale
Arrayit believes that many and possibly all human illnesses are caused by the improper expression of subsets of cellular genes that alter specific cellular processes, leading to defined disease states. In many cases, mutations in the DNA blueprint alter protein function, which in turn causes elevated or reduced expression of specific genes essential for proper cellular function. This rationale has an important implication: human diseases including Parkinson’s Disease are readily decipherable by quantitative analysis of gene expression at the level of the whole human genome. We used this rationale to decipher PD.

Parkinson’s Disease Biomarkers
Arrayit identified biomarkers for Parkinson’s Disease by detecting red and green spots in H25K microarray data. The red-green two color labeling method was employed to ensure that all markers identified in the study accurately reflect the PD disease state. In the two-color approach, one H25K microarray (left) was hybridized with a fluorescent probe mixture containing Parkinson’s patient cDNA labeled with red Cy5 dye and the spousal control sample was labeled with a green Cy3 dye. A second H25K microarray (right) was hybridized with a fluorescent probe mixture containing Parkinson’s patient cDNA labeled with green Cy3 dye and the spousal control sample was labeled with a red Cy5 dye. Bona fide biomarkers for PD appear as red spots on the first microarray and green spots in the second microarray. This “dye swap” approach eliminates biomarker false positives and confers a technical advantage for the Arrayit methodology.

Arrayit offers a complete line of instruments, tools, kits, reagents and software to fully support Microarray experimentation.

Parkinson’s Microarrays...see web site for Cat. numbers
microarray
instrumentation, products and services

Explore the Super Natural World

arrayit.com

Arrayit Corporation (408) 744-1331 USA e-mail arrayit@arrayit.com  OTCQB: ARYC

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