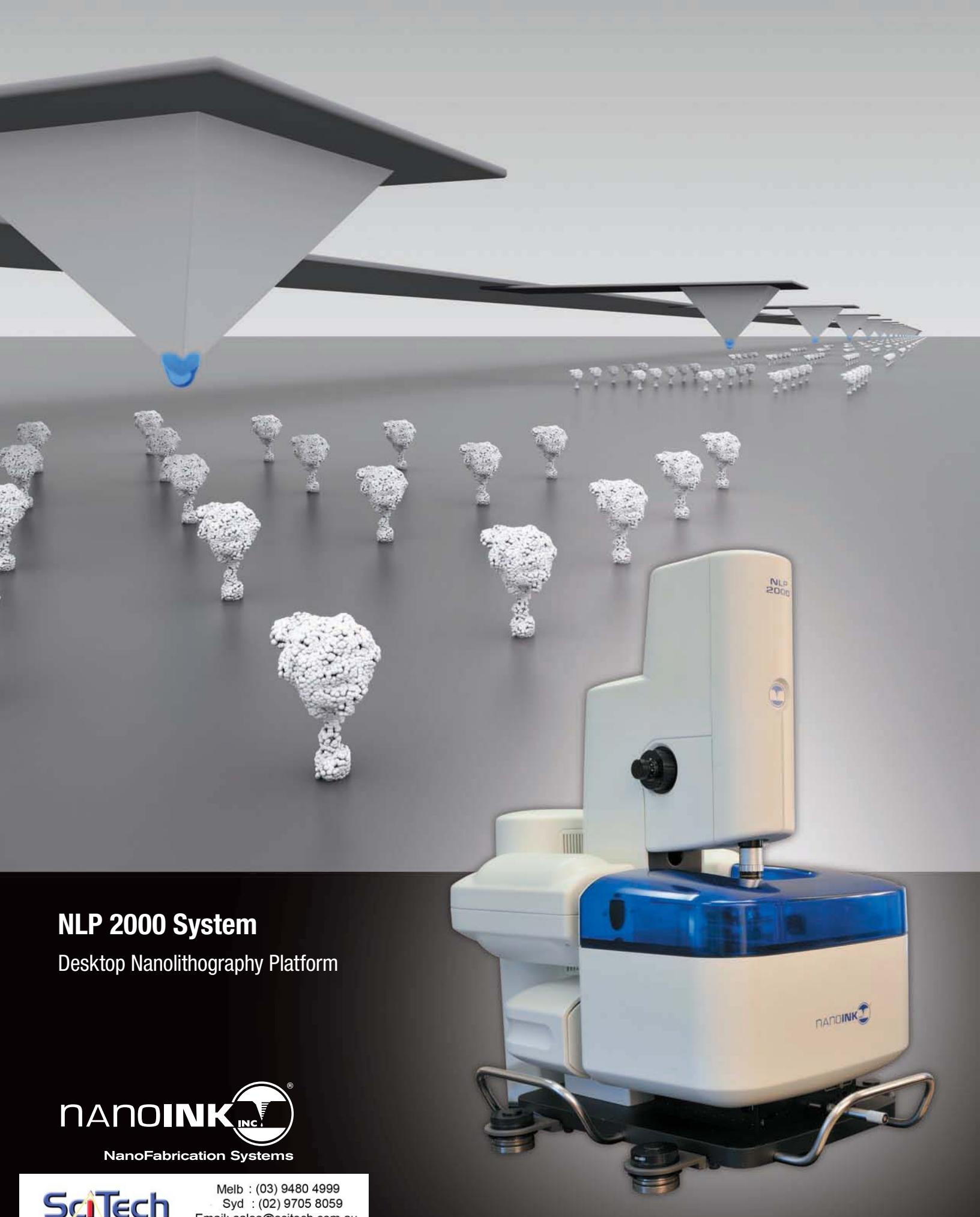

NLP 2000 System

Desktop Nanolithography Platform

nanoINK INC.®

NanoFabrication Systems

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the imaging specialists

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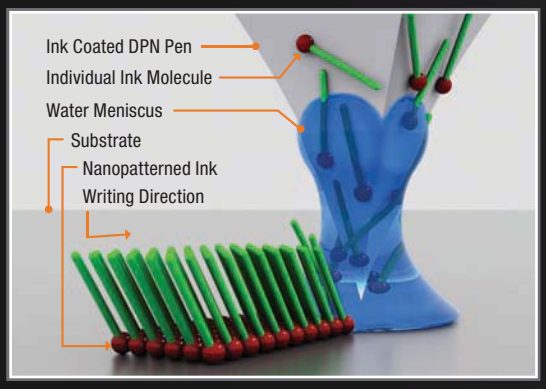
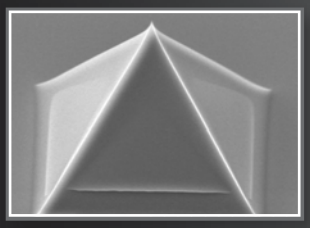
The NLP 2000 System

Simple Nanofabrication

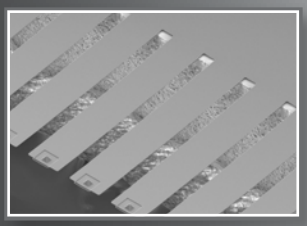
The NLP 2000 is an easy to use and affordable desktop nanofabrication system. Virtually anyone can use it. Patterns of nano to micron-sized features can be created with a wide variety of materials from metal nanoparticles to biomolecules. Researchers are able to rapidly design and create custom engineered and functionalized surfaces, using the proven technique of Dip Pen Nanolithography® (DPN®) to transfer minute amounts of materials (easily less than nanoliters) over a large, environmentally controlled work area.



Schematic of the DPN Process



The extremely sharp radius (less than 15nm) of the SiN tips allows researchers to deposit features below 50nm in size.



A 1-dimensional array of probe tips allows for scalability using the DPN process.

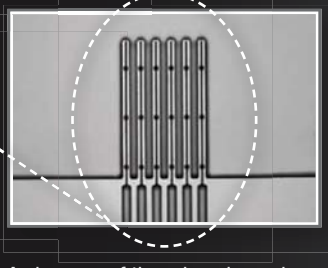
Solving the Multiplexing Equation

How does the user get the desired inking materials onto the tips?

NanoInk's custom micro-electro-mechanical (MEMs) facility enables the production of microfluidic ink delivery systems called inkwells. The reservoirs on the inkwell chip may be individually filled with microliter-sized aliquots of different materials to be deposited which in turn fill precisely aligned microwells. The arrays of writing tips are simply aligned and dipped into the microwells using the high quality optics and video of the NLP. Within minutes, the operator can create a customized nano or microarray of many different materials.

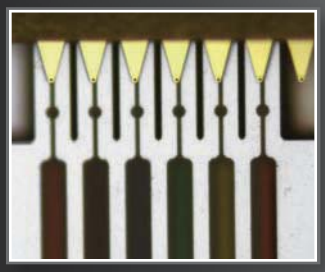
The Inkwell Chip

NanoInk's custom-machined inkwells for coating DPN probe tips.



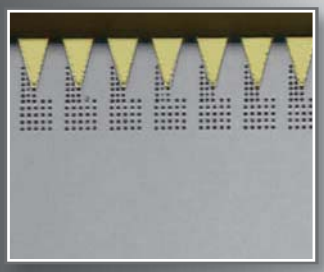
A close-up of the microchannels leading to the microwells.

Pens Being Inked



The tips of a multi-probe array simultaneously dipping into multiple inks in the microwells.

Pens Drawing the Pattern



1-dimensional 12-pen multi-probe printing arrays of dots.

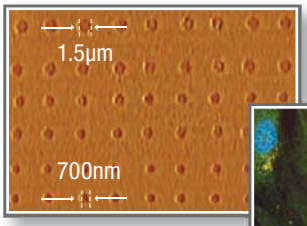
Applications

User Control of Feature Size

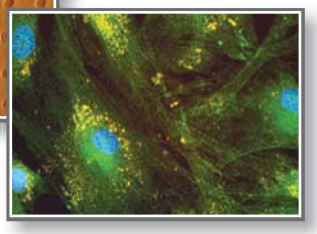
The NLP system is capable of creating extremely small and precisely located nanostructures.

This example shows the result of varying dwell times on depositions of a commonly used alkanethiol molecule on a gold surface.

These small features are being created and used to influence human mesenchymal stem cell differentiation.



Patterned MHA structures decreasing in feature size from top to bottom.



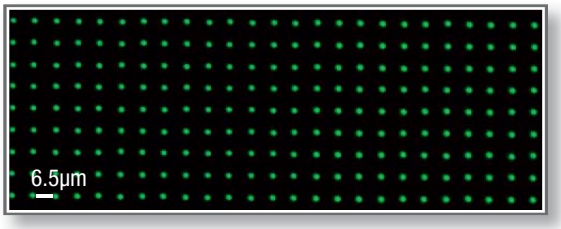
Stem cell adhesion and spreading on a patterned substrate.

Reproducible Deposition

The NLP system is capable of consistently producing large arrays with very small feature sizes.

NanoInk's multiple pen arrays allow the user to pattern various proteins or molecules upon substrates.

This is demonstrated by the sub-micron deposition of the fluorescently labeled peptide (HER2 receptor kinase Alexa Fluor 488). The center to center spacing is approximately 6.5 microns and the feature size is less than 1 micron in diameter.



Dot arrays of peptides patterned onto a substrate.

Other Applications

- DNA Nanoarrays
- Cell Adhesion / Motility Studies
- Protein Binding Experiments
- Cellular / Tissue Engineering

Features

- Biocompatible Nanolithography
- Create Arbitrary Patterns
- Multiplexed Deposition
- Nanoscale Registry

Ability to pattern directly onto tissue culture dish.

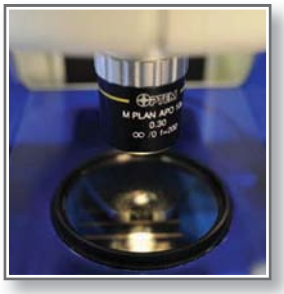
Unique Features

Sub-micron Resolution with NLP Optics

The NLP system offers state-of-the-art high resolution optics.

The high resolution optics permit alignment and precise pattern observation of features below 1 micron in size.

The images are integrated with software controlling zoom, focus, and illumination levels.



Substrate Versatility

The NLP system allows scientists to use a diverse range of substrates.

The ability to utilize a diverse range of substrates commonly employed in day-to-day research, allowing depositions onto a variety of materials and standard consumables, enables complete versatility. For example, the stage can accommodate a standard optical microscope slide. This makes the creation of micro or nanoarrays easily portable to currently used detection systems. The stage is versatile enough to permit the use of a tissue culture dish.

The NLP 2000 System

Tip-based Nanofabrication Made Easy

Designed to serve the increasing need for large area depositions of nanoarrays this new Dip Pen Nanolithography-based instrument is the first system capable of fabrication of sub-micron features over large substrates. With a dynamic range of deposited feature sizes ranging from sub-100nm to over 10µm, the NLP 2000 system brings truly unique capabilities to the world of nanofabrication.

Features of the NLP 2000

- High quality optics for sub-micron resolution
- Environmental chamber for temperature and humidity control
- High speed 5-axis nano-positioning stage over 40mm range
- Uses NanoInk's proven DPN technology and wide range of MEMs based ink delivery solutions
- Simplified user interface
- Integrated vibration isolation
- Feature sizes from less than 100nm to greater than 10µm

NanoInk NanoFabrication Systems Division

NanoInk, Inc. is an emerging growth technology company specializing in nanometer-scale manufacturing and applications development for the life science and semiconductor industries. Using Dip Pen Nanolithography (DPN), a patented and proprietary nanofabrication technology, scientists are enabled to rapidly and easily create nanoscale structures from a wide variety of materials. This low cost, easy to use and scalable technique brings sophisticated nanofabrication to the laboratory desktop.

Located in the new Illinois Science + Technology Park, north of Chicago, NanoInk currently has over 160 patents and applications filed worldwide and has licensing agreements with Northwestern University, Stanford University, University of Strathclyde, University of Liverpool, California Institute of Technology and the University of Illinois at Urbana-Champaign.

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