

## PEG Hydrogel Printing Kit

### Introduction

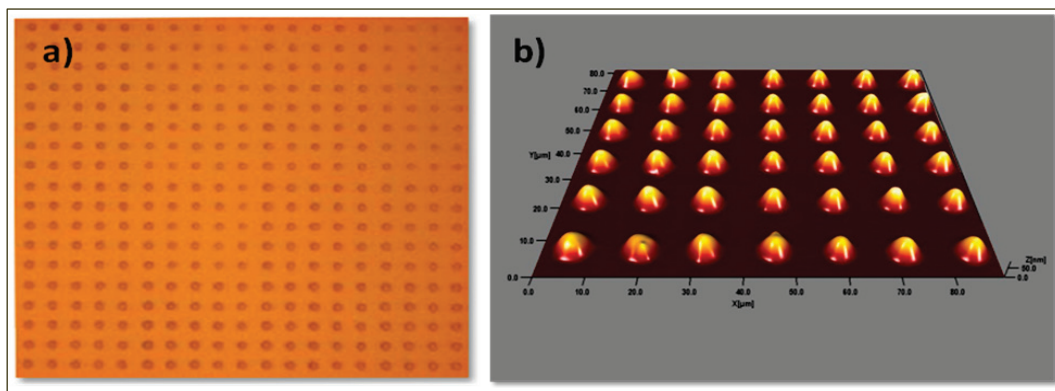
The PEG Hydrogel Printing Kit includes all the reagents and consumables necessary for patterning micro-scale PEG hydrogels using NanoInk's Dip Pen Nanolithography<sup>®</sup> (DPN<sup>®</sup>) Systems and tools.

### Applications

Hydrogels are three-dimensional cross-linked polymer networks that have physical characteristics similar to those of natural tissue. The versatility of polyethylene glycol (PEG) chemistry and the biocompatibility of PEG-based hydrogels make PEG hydrogels ideal for regenerative medicine applications and *in vitro* cell culture studies and as tissue engineering scaffolds. In addition, sub-cellular scale hydrogels that contain functional biomolecules have been used extensively for proteomic analyses, drug screening, and biological sensor development applications.

### PEG Hydrogel Printing

The Peg Hydrogel Printing Kit is compatible with all NanoInk nanofabrication systems. Figure 1 shows brightfield and atomic force microscopy images of a representative polymerized PEG hydrogel array created by the NLP 2000 System with the PEG Hydrogel Printing Kit.



**Figure 1:** (a) Brightfield image showing  $\sim 7 \mu\text{m}$  sized PEG hydrogel features. (b) Atomic force microscope image showing the  $\sim 85 \text{ nm}$  height profile of PEG hydrogel spots.

### Features and Benefits

*Patterning flexibility:* Using NanoInk's tip-based lithography systems and consumables with the PEG Hydrogel Printing Kit, users can easily manipulate the hydrogel printing process to create any number of nanopatterns.

# PEG Hydrogel Printing Kit

(continued)

**Customizable feature sizes:** Feature sizes of 1 - 8  $\mu\text{m}$  can be created by selecting the appropriate cantilever “pen” tip to deposit features, specifying the cantilever “pen” contact time with the substrate, and adjusting the patterning environmental conditions.

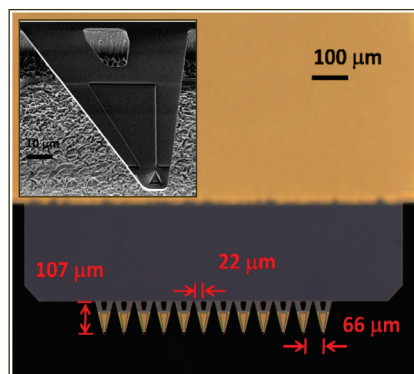
**Highly uniform features:** DPN system-generated PEG hydrogel domains typically exhibit a coefficient of variation (CV) of  $\sim 15\%$  over the entire pattern.

**High throughput printing:** The PEG Hydrogel Printing Kit is capable of depositing 15 – 25 features per loading.

## Kit Components

The PEG Hydrogel Printing Kit (Figure 2) includes all cantilever “pens” (Figure 3), reservoir “inkwells” (Figure 4), solutions and substrates necessary to pattern PEG hydrogels, as well as a detailed printing protocol:

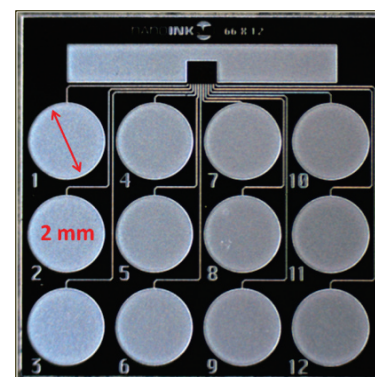
- Multi-Array Type-M Pens, Qty. 5
- Inkwell Chips Type M-12MW, Qty. 3
- Silicon Dioxide Substrates, Qty. 4
- PEG Hydrogel Printing Solution, 100  $\mu\text{L}$
- Photoinitiator Solution, 20  $\mu\text{L}$
- PEG Hydrogel Printing Protocol



**Figure 3:** Type-M “pens” contain an array of 12 A-frame shaped cantilever “pen” tips spaced 66  $\mu\text{m}$  apart. Probes have a spring constant of 2.6 N/m and a specially-designed, recessed channel for improved transport of printing liquid.



**Figure 2:** PEG Hydrogel Printing Kit



**Figure 4:** Type M-12MW “inkwells” contain 12 separate reservoirs that feed printing liquid to the microwells into which “pen” tips are dipped. Channel spacing matches the “pen” tip spacing of Type-M “pens.”

## System Compatibility

For use with the NLP 2000 System, DPN 5000 System, and NSCRIPTOR™ System