Supplementary Material (ESI) for *Nanoscale*

Supporting Information

Programming Nanostructures of Polymer Brushes by Dip-Pen Nanodisplacement Lithography (DNL)

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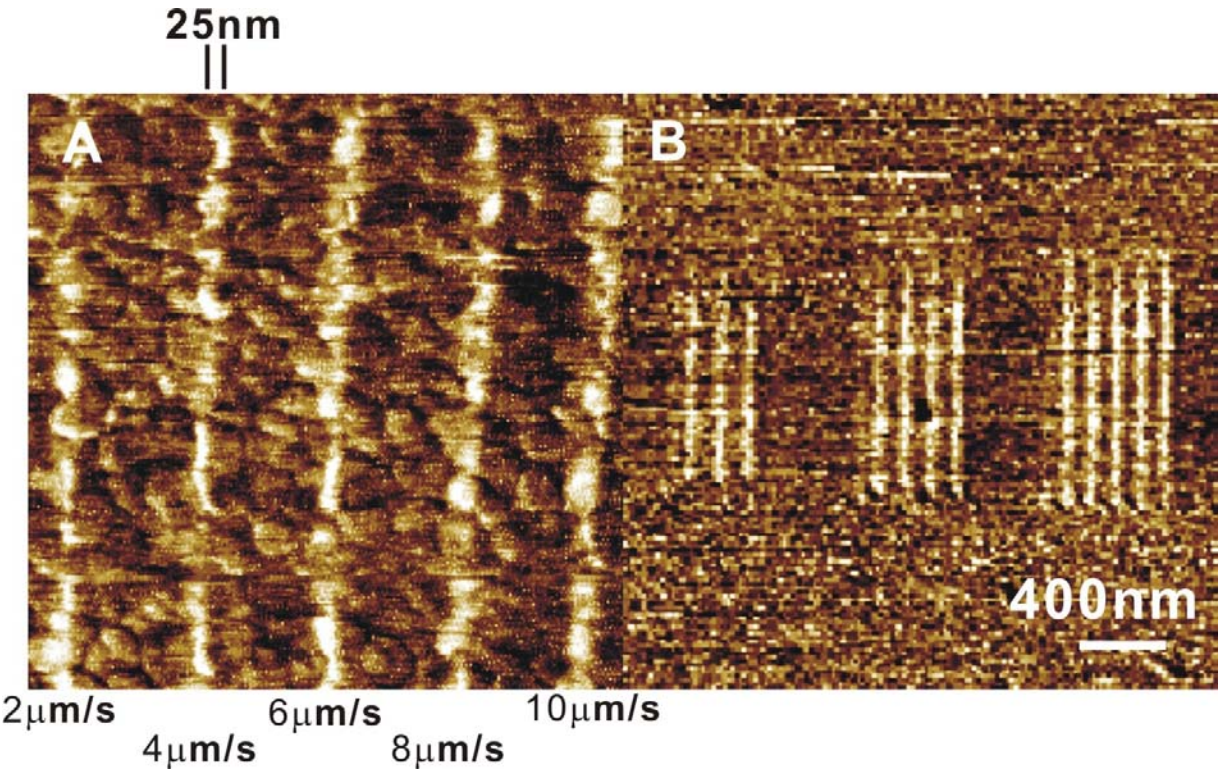

FigureS1. LFM images of patterned MUDBr lines by DNL.

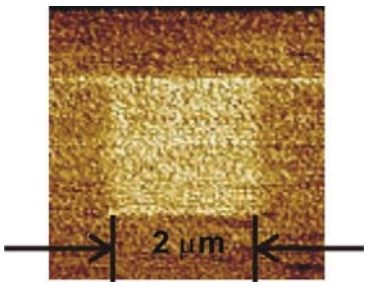

Figure S2. LFM image of 2 μm×2 μm MUDBr square written by DNL at 100 μm/s and 20% relative humidity.

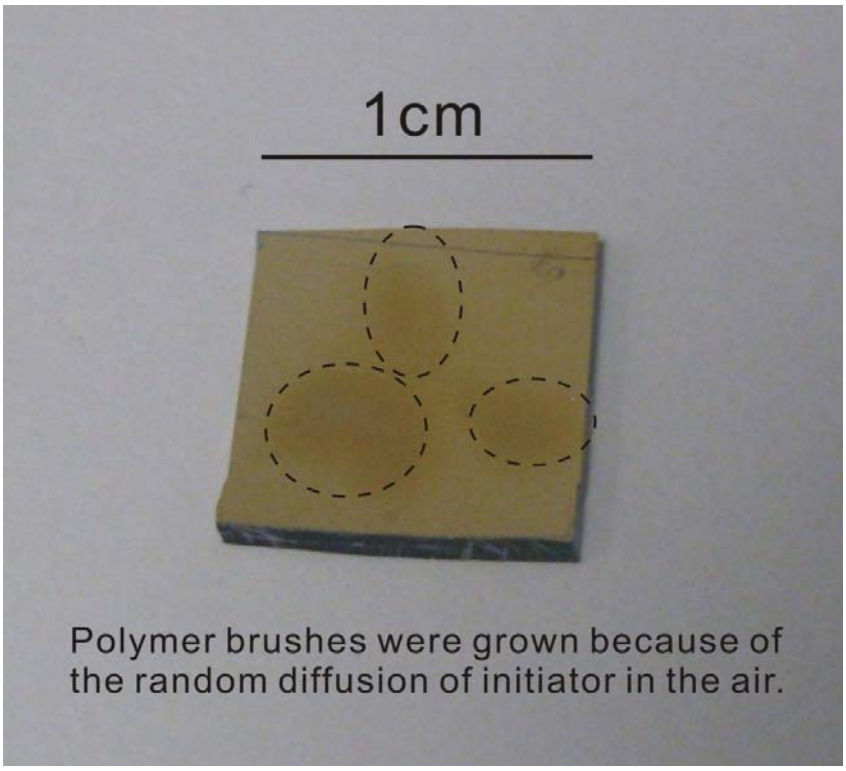

Figure S3. Digital image of polymer brushes grown on top of gold substrate (without any passivation layer). A DPN tip inked with MUDBr was held on top of the substrate for 1 hr. MUDBr was diffused in the air and self-assembly randomly onto the gold surface. The highlighted areas are those heavily covered with PMETAC brushes.

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Table 1 Comparison among DPN, Nanografting, and DNL

SPL method	Working Mechanism	Operation Environment	Major advantages	Major drawbacks
DPN	Ink molecules diffuse through water meniscus	In air with controlled humidity and temperature	Constructive method, little crosstalk at multiplexing; parallel patterning method demonstrated; feature size controlled by diffusion	Difficult to control ink diffusion; not suitable for volatile inks; feature size limited to size of water meniscus and speed of ink diffusion
Nanografting	AFM tips scratch SAM resist and ink molecules dissolved in the solution graft onto uncovered area	In solution	Higher resolution than DPN; suitable for a wide variety of inks; feature size controlled by scanned areas	Difficult to operate in solution; contamination and crosstalk can be a major problem at multiplexing; parallel patterning not demonstrated
DNL	AFM tips scratch SAM resist and ink molecules on the tip self-assemble onto uncovered area	In air, no special control of humidity and temperature needed	Similar resolution to nanografting; suitable for a wide variety of inks; low crosstalk at multiplexing; grafting density controllable with applied force; feature size controlled by scanned areas	Parallel patterning not demonstrated