Supporting Information for:

Spatially-Controllable and Uniform Photochemical Transfer Printing of Block Copolymer Nanopatterns

Dustin W. Janes,*[1] Takejiro Inoue,[2,3] Nathan D. Prisco,[4] Michael J. Maher,[5] Paul F. Nealey,[2] Christopher J. Ellison*[6]

1 Joris Helleputteplein 5, 3000 Leuven, Belgium

2 Institute for Molecular Engineering, The University of Chicago, 5801 South Ellis Avenue, Chicago, IL 60637

3 Electronic and Imaging Research Laboratories, Toray Industries, Inc. 1-2, Sonoyama 3-chome, Otsu, Shiga 520-0842 Japan

4 McKetta Department of Chemical Engineering, The University of Texas at Austin, 200 East Dean Keaton Stop C0400, Austin, TX 78712 USA

5 Department of Chemistry, The University of Texas at Austin 105 E. 24th St. Stop A5300 Austin, TX 78712 USA

6 Department of Chemical Engineering and Materials Science, University of Minnesota, 421 Washington Ave. SE, Minneapolis, MN 55455 USA

* Corresponding Author Emails: djanes1@gmail.com, cellison@umn.edu

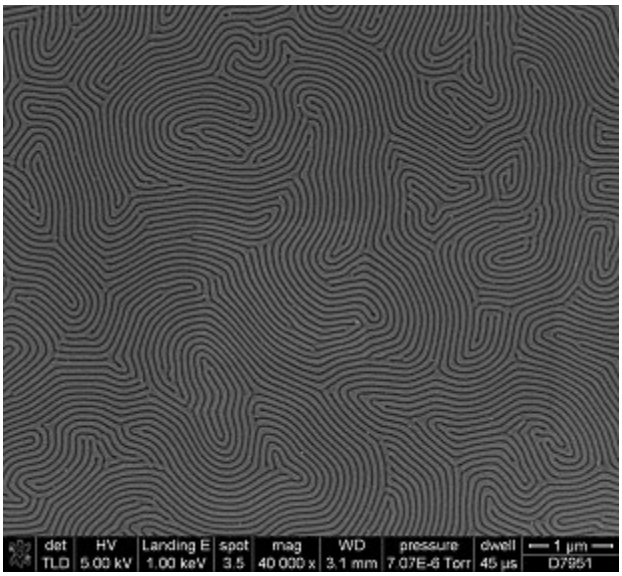

Figure S1. Representative SEM image of the Master film formed at L_0 = 87 nm using 105 kDa-b-106 kDa PS-b-PMMA via a sequential solvent annealing and thermal annealing driven self-assembly process.[1, 2]

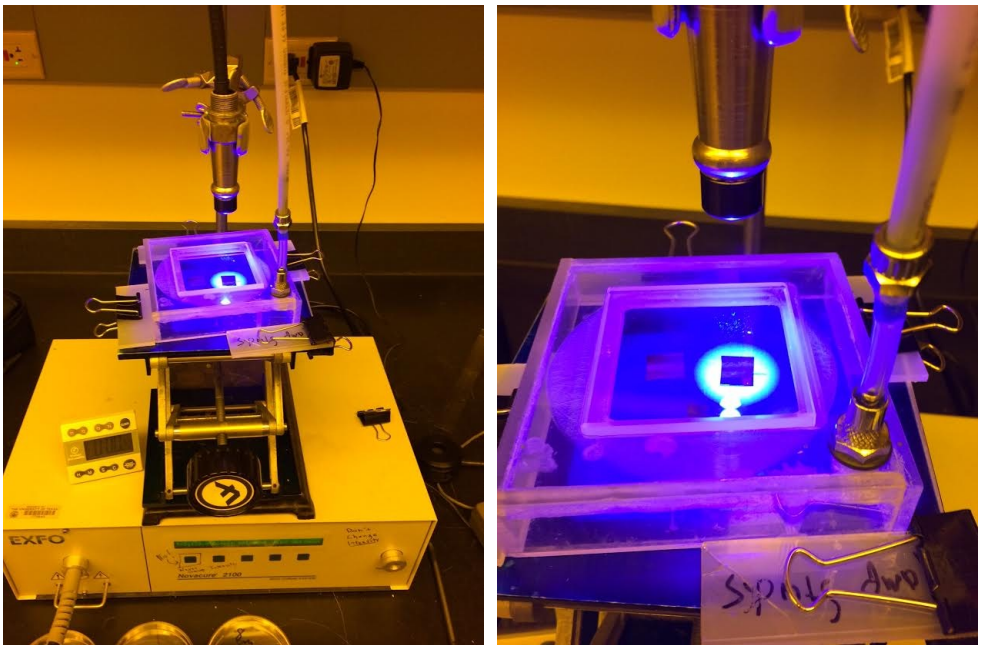

Figure S2. Photographs of the N_2 purge chamber and exposure process depicted by Figure 1a; in this step PSSMA is grafted to the Master film.

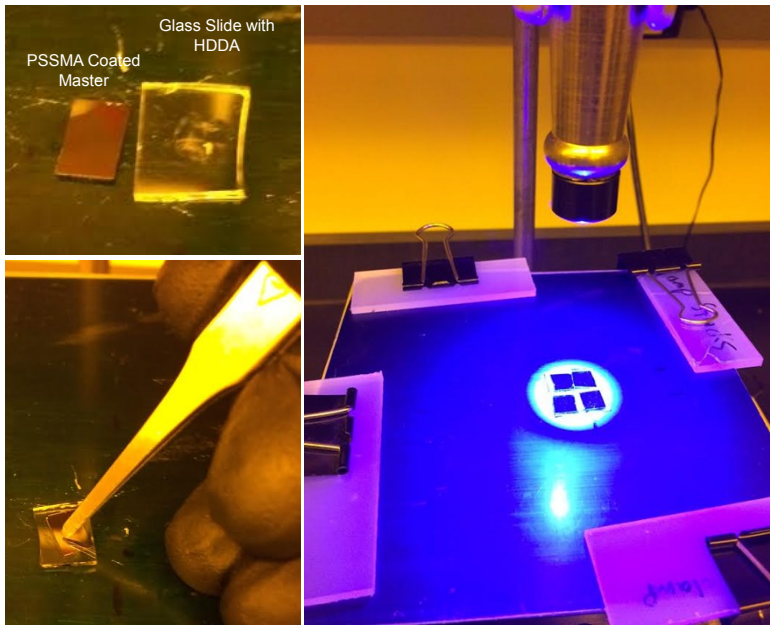

Figure S3. Photographs of the process depicted by Figure 1b; in this step the chemical nanopattern is adhered to the Replica substrate.

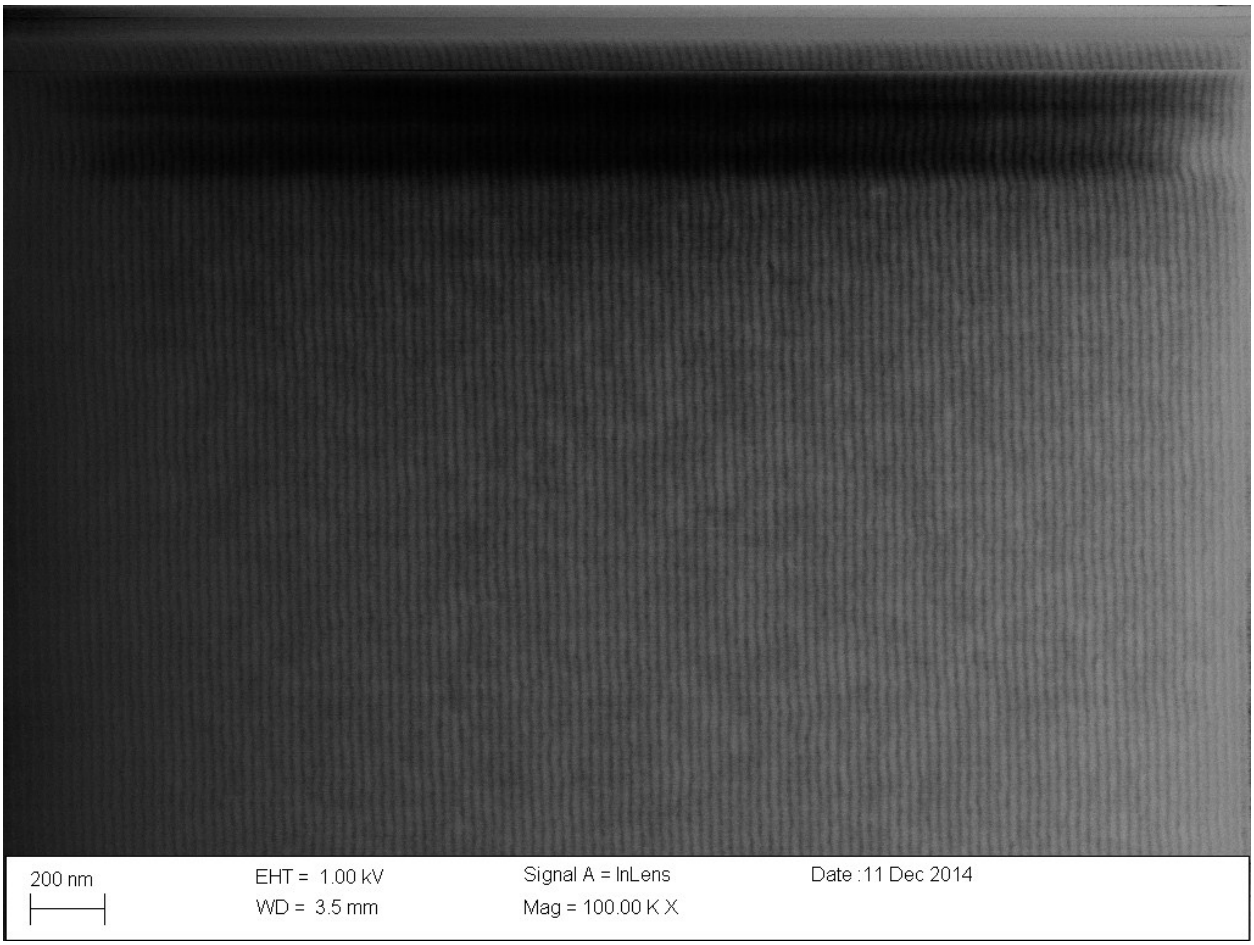

Figure S4. Unedited SEM image of the Replica sample from which the center panel of Figure 2 was excerpted. The distortion at the top of the image arises from charging artifacts of the non-conductive polymer film.

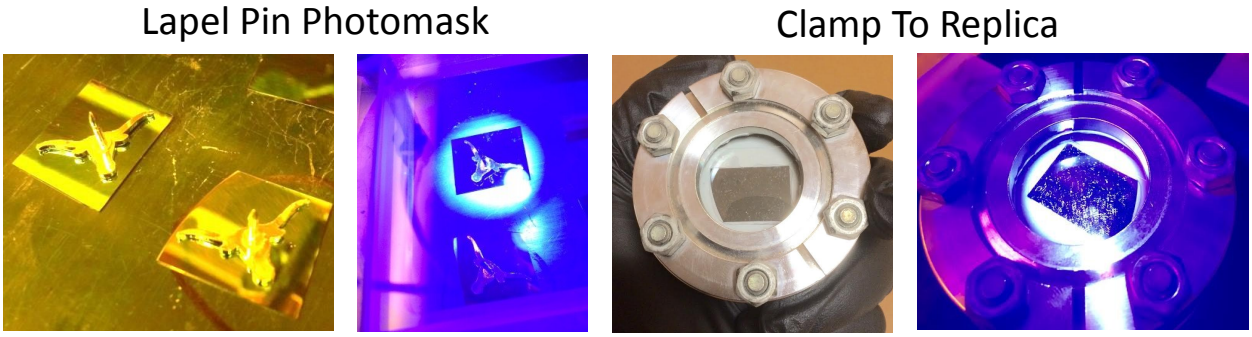

Figure S5. Photographs of the two light exposure steps used to fabricate the example of large area, spatially controlled PTP in Figure 3.

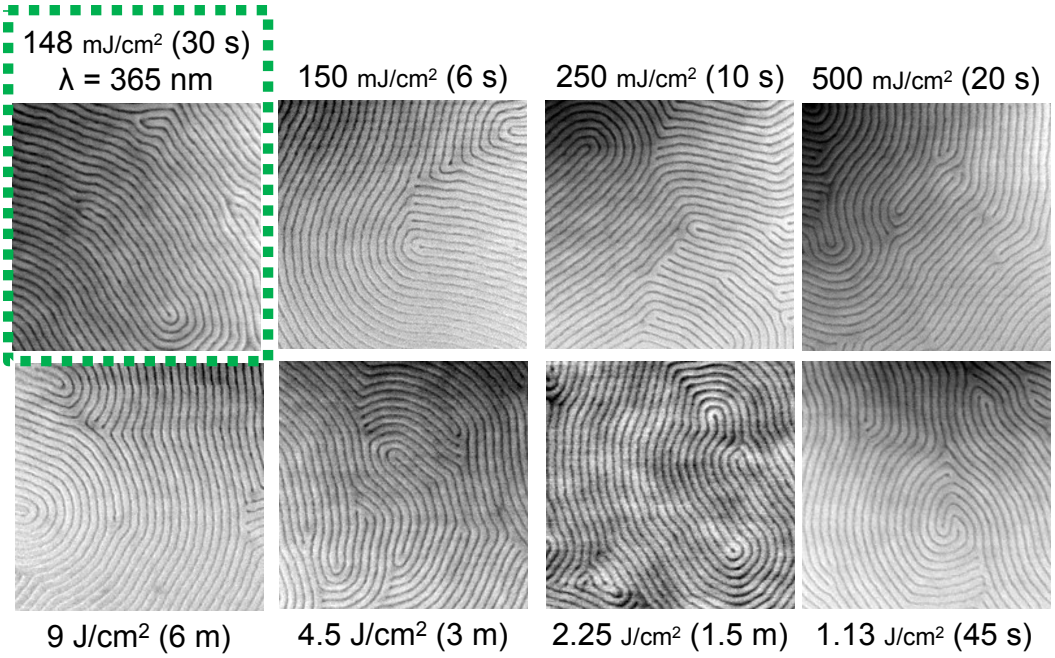

Figure S6. Representative 1 μm² SEM images of Replica samples in which the exposure dose used to photopolymerize the liquid conformal layer (Figure 1b) increases clockwise, starting in the upper left panel. L_0 = 42 nm fingerprint films were used as Masters in this experiment. Note that the lowest dose listed has been passed through a λ = 365 nm bandpass filter; the other samples were prepared with a broadband exposure. PTP was successful at every dose, even when using wavelengths of light that are not absorbed by PSSMA. Therefore the only critical criteria for the photoexposure step depicted in Figure 1b is that it be sufficient to photopolymerize the liquid conformal layer.

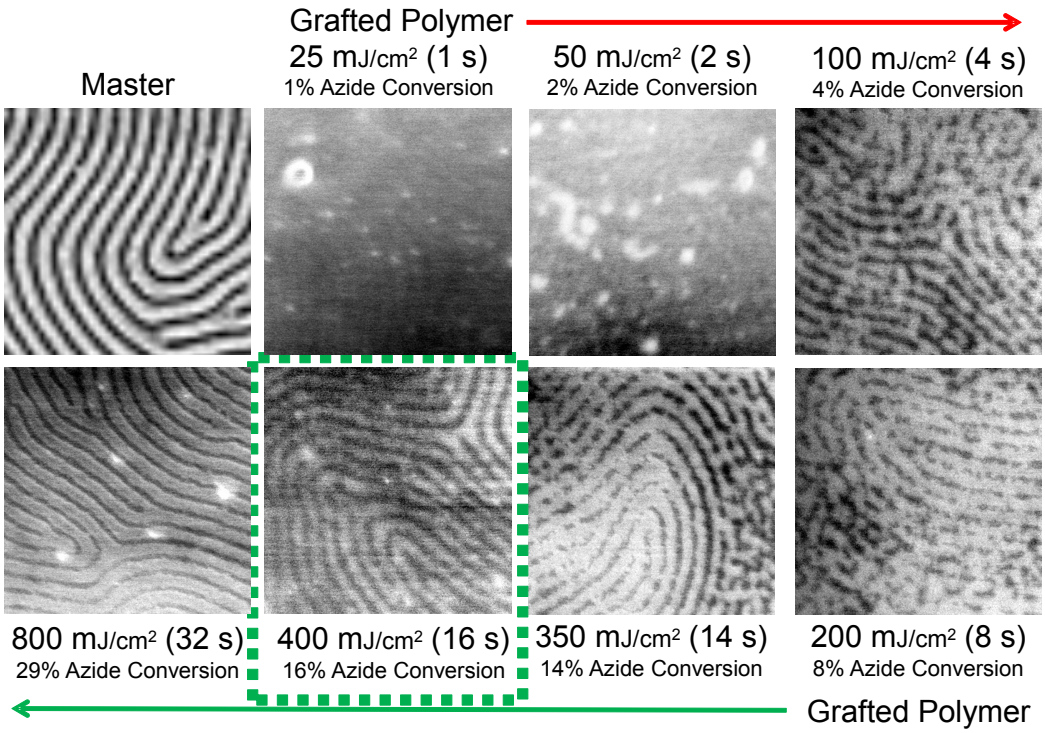

Figure S7. Representative 1 μm^2 SEM images of the L_0 = 87 nm PS-b-PMMA Master film and grafted monolayers formed atop replica samples after separation, sonication, and rinsing by toluene. The broadband dose, duration of exposure, and photochemical conversion of azide groups increases clockwise and is indicated adjacent to the images. This data is intended to complement Figure 5.

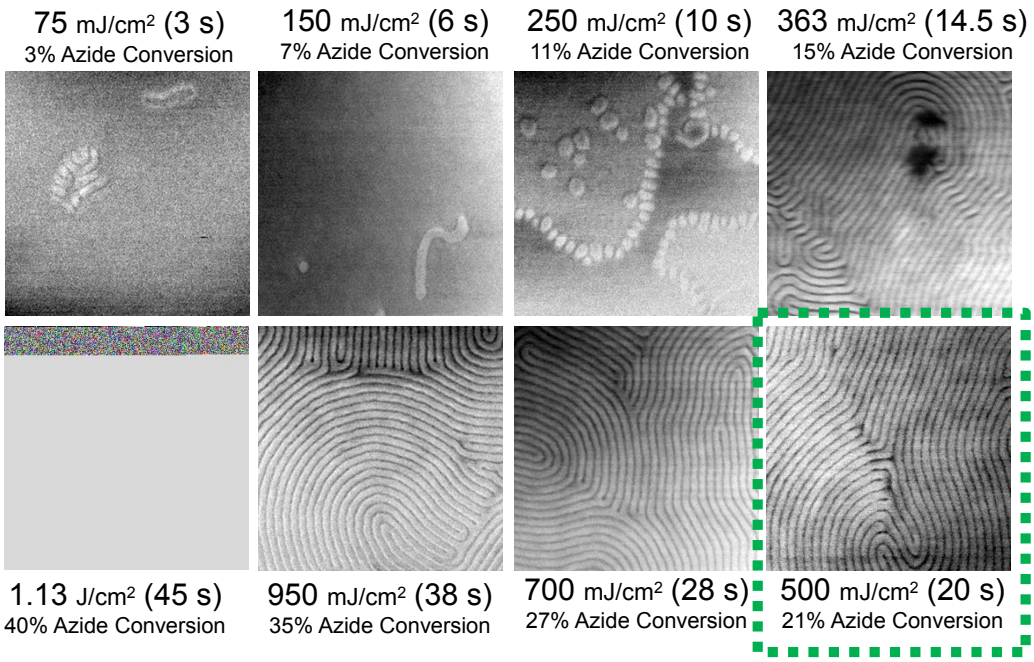

Figure S8. Representative 1 μm^2 SEM images of L_0 = 42 nm PS-b-PMMA patterns formed atop Replica samples after spin-coating and annealing of a $1L_0$ thick reassembly layer atop them. The broadband dose, duration of exposure, and photochemical conversion of azide groups increases clockwise and is indicated adjacent to the images. This data is intended to complement Figure 6.

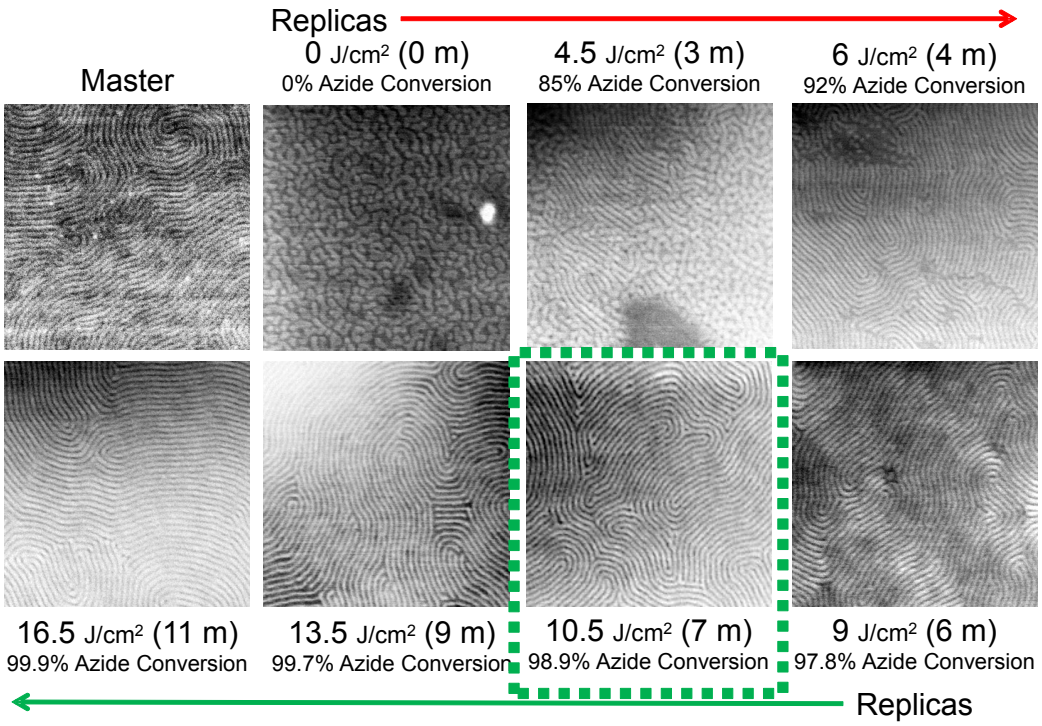

Figure S9. Representative 1 μm^2 SEM images of L_0 = 28 nm PS-b-PMMA Master film and Replica samples made using PTP. The broadband dose, duration of exposure, and photochemical conversion of azide groups increases clockwise and is indicated adjacent to the images. This data is intended to complement Figure 7.

Works Cited

1. R. P. Kingsborough, R. B. Goodman, K. Krohn and T. H. Fedynyshyn, *Proc. SPIE*, 2009, **7271**, 72712D-72712D-72710.
2. E. Kim, H. Ahn, S. Park, H. Lee, M. Lee, S. Lee, T. Kim, E.-A. Kwak, J. H. Lee, X. Lei, J. Huh, J. Bang, B. Lee and D. Y. Ryu, *ACS Nano*, 2013, **7**, 1952-1960.