Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Advantages of Using Soft Materials in Scanning Probe Lithography KEITH A. BROWN, DANIEL J. EICHELSDOERFER, MARY X. WANG, CHAD A. MIRKIN, Northwestern University — Scanning probes based upon soft materials provide new capabilities and insights into the science of scanning probe lithography. Specifically, we have explored a cantilever-free architecture that consists of an array of sharp probes on an elastomeric film on a glass slide. This architecture allows every probe in an array to be in simultaneous, gentle contact with a surface, allowing one to perform lithography with millions of probes in parallel. Here, we describe three recent developments in cantilever-free scanning probe lithography that were enabled by the elastomeric material. 1) As the mechanical properties of elastomers can be readily tuned, it is possible to tailor the spring constant of the probes.[1] 2) The high coefficient of thermal expansion of elastomers means that local heating can be used to physically actuate individual probes allowing for arbitrary patterning.[2] 3) Solvents retained in the elastomer can mediate molecular printing and allow a user to pattern hydrophilic and hydrophobic materials in totally dry environments. [1]D. J. Eichelsdoerfer, *et al.*, Nano Lett. **13**, 664 (2013). [2]K. A. Brown, *et al.*, Proc. Natl. Acad. Sci. USA **110**, 12921 (2013).

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Date submitted: 15 Nov 2013 Electronic form version 1.4