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Expanding the Range and Utility of Atomic Calligraphy[1]
LAWRENCE BARRETT, THOMAS STARK, JEREMY REEVES, RICHARD LALLY, DAVID BISHOP, Boston University — Due to the many potential applications of nanotechnology, there is a drive for new methods of nanomanufacturing. Atomic calligraphy has shown promise, not only as faster and as more economical than conventional methods, but also more precise, potentially being able to place single atoms with nanometer resolution [1]. Atomic calligraphy utilizes nanoscale apertures to define where material is deposited during evaporation. Microelectromechanical systems (MEMS) allow the aperture to be moved with nanometer precision. The technique has been demonstrated, but only over a small range of several microns and structures were written on the same substrate as the MEMS. We have moved from this to a system where structures can be written on any surface over a range of centimeters. To achieve this, first a process for etching through the substrate without damaging the delicate MEMS was developed. Then a scheme for making electrical contact to the MEMS with a low enough profile to still allow the aperture to be brought in contact with the writing surface was devised. Finally, a system of piezo stages was installed to quickly and precisely move the aperture from one area to another. [1] M. Imboden, H. Han, J. Chang, F. Pardo, C. A. Bolle, E. Lowell, and D. J. Bishop, Nano Lett. 13, 3379 (2013).

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