Abstract Submitted
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A MEMS Based Stencil Lithography Approach to Nanomanufacturing[1] LAWRENCE BARRETT, THOMAS STARK, Division of Material Science Engineering, Boston University, JEREMY REEVES, Department of Electrical Computer Engineering, Boston University, RICHARD LALLY, DAVID BISHOP, Division of Material Science Engineering, Boston University — We have developed a microelectromechanical systems (MEMS) based approach to nanomanufacturing called atomic calligraphy. Comb drive actuators position a stencil with sub-nanometer precision and material is deposited through the stencil on to a substrate. The MEMS device is aligned to the substrate using piezoelectric stages and capacitive and resistive measurements. Using the piezo stages in conjunction with the comb drive actuators, increases the writing range from the range of the comb drive actuators (˜10 μm) to the range of the piezo stages (5 cm) without sacrificing resolution. Among the advantages of this method is its scalability. Thousands of MEMS devices can be used to write structures in parallel, and if the stencil on each device contains an array of structures, 10^6 to 10^8 structures can be fabricated in parallel. Because there is no wet processing, this technique can be used to fabricate structures on a wide range of materials including many polymers. Arrays of optical metamaterials have been fabricated with this approach and characterized both with scanning electron microscopy (SEM) and optical techniques.

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