

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

3D Alignment of nanowriters using fringe capacitance¹ RICHARD LALLY, THOMAS STARK, JEREMY REEVES, LAWRENCE BARRETT, DAVID BISHOP, Boston University — With the introduction of atomic calligraphy, high resolution nanoscale structures can be fabricated rapidly over a large surface area [1]. This reliable, chemically stable and cost effective nanoscale writing method can be applied to a number of interesting applications. One specific application of this writing approach is to fabricate metamaterials, a process that requires precise alignment of the MEMS and substrate. Here we present a MEMS based solution coupling the well-studied comb drive capacitance effects [2] with the less predictable close order fringe effects. The combined capacitance allows for precise measurements in the nanometer range. Using two sets of orthogonal static MEMS comb drives, the capacitance is used to discern the x, y, and z spatial displacement from the substrate. The unique SOI wafer is prepared creating a periodic array of silicon pillars. Placement of additional MEMS comb drives at the MEMS device edges will allow stage corrections for tip, tilt and rotational alignment thereby reducing the effects generated by variations in wafer thickness and surface smoothness. [1] Imboden, M. and Bishop. D. Physics Today. 2014, 67 (12), 45-50. [2] Elshurafa, A. and El-Masry, E. J. Micromech. Microeng. 2010, 20(4), 045027

¹This work is funded by the DARPA A2P Program

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Date submitted: 06 Nov 2015

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