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Digitally Programmable Micro Evaporation Source for Nanofabrication HAN HAN, MATTHIAS IMBODEN, Boston University, PABLO DEL CORRO, Instituto Balseiro, THOMAS STARK, RICHARD LALLY, Boston University, FLAVIO PARDO, CRIS BOLLE, Bell Labs, Alcatel-Lucent, DAVID BISHOP, Boston University — There is a significant world-wide effort to develop nanomanufacturing methods that can extend into the deep nanoscale region, below 20 nm. Techniques include photolithography, nano-imprint and direct write methods such as dip-pen lithography and atomic calligraphy. A central component of any fabrication setup is the deposition control of the materials to be used. Here we present a MEMS based, multi-material evaporation source array with each source element consisting of a polysilicon plate suspended by two electrical constriction leads. When resistively heating the plate, the pre-loaded material is thermally evaporated off of the plate. By arranging many of these devices into an array, one has a multi-material, digitally programmable evaporation source. Pulsing the source with precisely controlled peak voltage and timing can emit atom fluxes with an unprecedented level of control in terms of what, when and how many atoms get deposited. By varying their dimensions and arrangement, the source array can provide controllable atom fluxes ranging over ten orders of magnitude. Such a material source can provide precise control and flexibility when conducting nanopatterning and nanolithography.

Han Han
Boston University

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