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Mechanical manipulation of magnetic domains in continuous and patterned magnetostrictive FeGa thin films[1] PARIS ALEXANDER, SEAN FACKLER, ICHIRO TAKEUCHI, JOHN CUMINGS, University of Maryland - Department of Materials Science and Engineering — The controlled and reversible switching of magnetic domains using static electric fields has been previously demonstrated via magneto-electric (ME) coupling in a multiferroic system [T. Brintlinger, Nano Lett. 10, 1219(2010)]. In these systems, enhanced magnetostriction allows for magnetic switching in response to an electrically induced deformation. Here we demonstrate the nature of magnetic switching using mechanical stress alone. Magnetostrictive iron-gallium ($Fe_{70}Ga_{30}$) thin films are deposited on flexible free-standing membranes, and patterned to square arrays. Using a mechanically manipulated tip a strain is directly applied to the film. We observe the resulting magnetization dynamics using Lorentz-force transmission electron microscopy (LTEM). The varied hysteretic behaviors under applied magnetic and strain fields will be presented for both continuous and patterned films.

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