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All-thin-film multiferroic heterostructured cantilevers in linear and nonlinear dynamic regimes TIBERIU-DAN ONUTA, Materials Science and Engineering Department, University of Maryland, College Park, YI WANG, Physics Department, University of Maryland, College Park, SAMUEL E. LOFLAND, Physics Department, Rowan University, NY, CHRISTIAN J. LONG, Physics Department, University of Maryland, College Park, ICHIRO TAKEUCHI, Materials Science and Engineering Department, University of Maryland, College Park — We report on fabrication and characterization of all-thin-film multiferroic magnetoelectric (ME) cantilever devices and their different modes of operation in both linear and nonlinear dynamic regimes. The devices are built on micro-electromechanical system (MEMS) platforms that involve stress-engineered designs based on *silicon oxide/nitride/oxide (ONO)* stacks. The ME layers consist of a magnetostrictive $Fe_{0.7}Ga_{0.3}$ thin film and a $Pb(Zr_{0.52}Ti_{0.48})O_3$ piezoelectric thin film. The resonant frequency was found to display DC magnetic field dependence indicative of the interplay between the anisotropy and Zeeman energies. In the magnetically-driven mode, the harvested peak power at 1 Oe is 0.7 mW/cm^3 (RMS) at the resonant frequency (*3.8 kHz*) and the quality factor also displays strong dependence on the DC magnetic bias. In certain conditions, the multiferroic devices show nonlinear behaviors important to logic implementation and parametric amplification.

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