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Resonant frequency shifts of Al micro-resonator by electric currents and nonlinear oscillation SEONG SOO KIM, JUNG HO KIM, KOOKRIN CHAR, School of Physics, Seoul National University, Seoul, Republic of Korea — Mechanical microbridge resonators are fabricated from polycrystallin aluminum thin film using micromachining processes. A movement of the microbridge smaller than a nm can be measured by optical method. The microstructures are self-oscillating or can be actuated by an external electrostatic field, and oscillations with quality factors up to 2400 in vacuum were measured. The observed resonant frequencies reveal the important role of the internal stress in thin metal film. A substantial resonance frequency shift induced by electric current was observed, which we attribute to thermal expansion caused by Joule heating. Nonlinear oscillation was observed readily due to the large length to thickness aspect ratio ($\sim$1000). Amplitude-dependent resonant frequency shifts show qualitative changes of the resonator response. We will try to correlate the motions of grain boundaries and/or dislocations with the resonator response.

Seong Soo Kim
School of Physics, Seoul National University, Seoul, Republic of Korea

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