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Effects of induced strain on GaAs nanomechanical resonator S.B. SHIM, CSCMR & School of Physics, Seoul National University, Seoul 151-747 Korea, A. GAIDARZHY, Department of Aerospace and Mechanical Engineering, Boston University, Boston, MA 02215, S.W. KANG, 1CSCMR & School of Physics, Seoul National University, Seoul 151-747 Korea, S.W. CHO, CSCMR & School of Physics, Seoul National University, Seoul 151-747 Korea, P. MOHANTY, Department of Physics, Boston University, Boston, MA 02215, Y.D. PARK, 1CSCMR & School of Physics, Seoul National University, Seoul 151-747 Korea — GaAs nanomechanical resonator structures, with patterned dimensions as small as 100 nm, were realized by e-beam lithography and by utilizing plasma-free wet etch chemistry processing techniques, to minimize any induced damages during fabrication, from latticed-matched low pressure MOCVD grown GaAs(500 nm)/InGaP(500 nm)/GaAs(001) heterostructures. The resulting doubly clamped GaAs suspended beams are characterized by magnetomotive techniques in cryogenic high vacuum conditions. An external strain is induced by applying a DC bias along with AC driving current in a constant magnetic field applied perpendicular to the length of the beam. We explore the B-squared dependence of the resonator response as affected by the induced strain as well as the position of the resonance peak in the frequency domain. We will also discuss the energy dissipation (1/Q) of the resulting beam structure due to induced strain as well as from induced damage and impurities in the GaAs layer.

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