Characteristics of polycrystalline 3C-SiC micro resonators with doping concentrations
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Abstract: This paper describes the fabrication and characteristics of polycrystalline (poly) 3C-SiC microresonators with $3 \times 10^{17} \sim 1 \times 10^{19}$ cm$^{-3}$ in-situ N-doping concentrations. In this work, the crystallinity, carrier concentration and surface morphology of the grown thin films were evaluated by X-ray diffraction (XRD), scanning electron microscopy (SEM) and atomic force microscopy (AFM). The $1.2 \mu$m thick cantilevers and the $0.4 \mu$m thick doubly-clamped beam microresonators with various lengths were implemented using in-situ doping poly 3C-SiC thin films. The characteristics of the poly 3C-SiC microresonators were evaluated using quartz and a laser vibrometer under vacuum at room temperature. The resonant frequencies of the SiC microresonators decreased with doping concentrations owing to the reduction of the Young's modulus of the poly 3C-SiC thin films. It was confirmed that the resonant frequencies of the poly 3C-SiC microresonators are controllable by adjusting the doping concentrations.

Key Words: Resonator, polycrystalline 3C-SiC, dopant amount