High Polarization and Output Voltage with BSTO Film-Based Flexible Piezoelectric Device for Biomimetic Artificial Cochlea Hair Cells

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We developed a ferroelectric BaSrTiO3 (BSTO) based piezoelectric acoustic nanosensors for artificial hair cell to mimic the functions of human hair cells. The acoustic nanosensors fabricated on flexible polyimide substrate by spin-coatings mimics the function of the natural human basilar membrane for frequency separation. As-synthesized acoustic nanosensors, artificial basilar membrane (ABM) has called a xylophone-like structure. In order to increase piezoelectric property, the ABM structures were subject to contact poling. Polarization vs. electric field dependency of ABM devices was measured at frequency 2 kHz from -3 to + 3 V using TF Analyzer Measurement System(TFAMS). We examined the tuning capability of the vibration amplitude vs piezoelectric sensing signals by LDV (Laser Doppler Vibrometer) system. The conceptual ABM devices of flexible BSTO on polyimide produced high polarization(50 ~ 75 uC/cm2) and output voltage (50 ~ 75 uV/cm2) at a wide frequency range of 500 ~ 2,000Hz.