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Piezoelectric Aluminum Nitride Thin Films Deposited onto Metal Layer for Micromachined Ultrasonic Transducers QIANGHUA WANG, JIANZENG XU, CHANGHE HUANG, RATNA NAIK, GREGORY W. AUNER, WAYNE STATE UNIVERSITY TEAM — Aluminum nitride (AlN) thin films were deposited onto metal on silicon substrates by plasma source molecular beam epitaxy (PSMBE) system. The low deposition temperature of 300-450 deg. C was chosen to make the process compatible with standard Si IC technology. X-ray diffraction (XRD) data show highly textured c-axis oriented films with strong (0002) AlN peaks. Micromachined ultrasonic transducers (MUT) have been successfully fabricated using Al/AlN/Al sandwich structure on silicon resonator. Electrical properties of AlN thin films and MUT devices were systematically characterized. The resonance of the flexural acoustic mode of our MUTs was determined at about 200kHz from the impedance measurements. The effective couple factor was derived from the resonant frequency and anti-resonant frequency of MUT devices. The development of this technology would have a great potential in the integration of acoustic sensing/transducing with MEMs technology.

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