

## **CMOS compatible, electrically transduced, acoustic bandgap structures**

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Here we present modeling and experimental results of acoustic bandgap (ABG) structures fabricated using CMOS compatible processes. Such devices are potentially of great interest for a range of communications and sensing applications. The 2-D ABG structures are based on a silicon dioxide matrix with tungsten scattering sites in either square or triangular arrays. To prevent loss of energy to the substrate the 2-D ABG membrane is separated from the substrate using a dry release process. This step requires release holes which can serve to complicate the band structure. Bulk waves are launched into the structure and detected using high quality piezoelectric AlN deposited by reactive sputtering.

To model the proposed ABG structures we developed a finite-difference time-domain (FDTD) algorithm for the temporal integration of the full elastic wave equation that incorporates both Lamé coefficients. Based on this we designed, fabricated and tested various bulk wave ABG structures targeted at ~20MHz and were able to obtain up to 50 dB attenuation in the bandgap region.

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