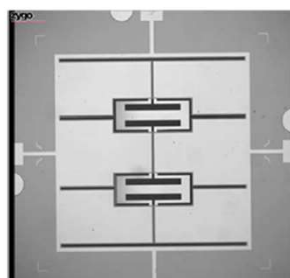
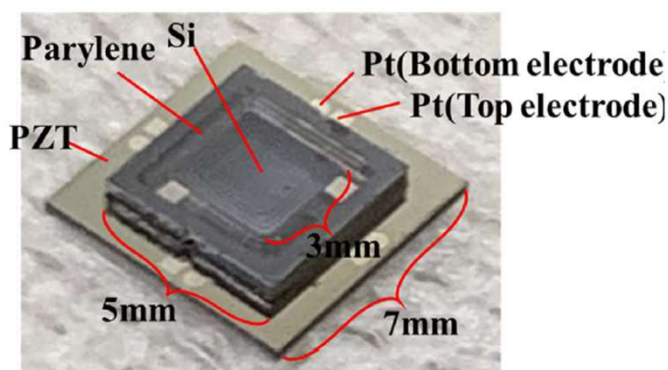


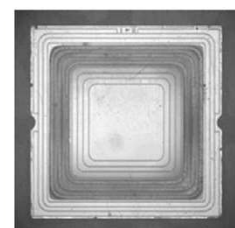


Piezo-true-MEMS speaker (for next generation TWS)

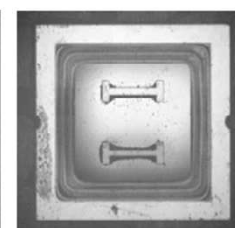
Tohoku University Tanaka Shuji lab



(a) PZT actuator

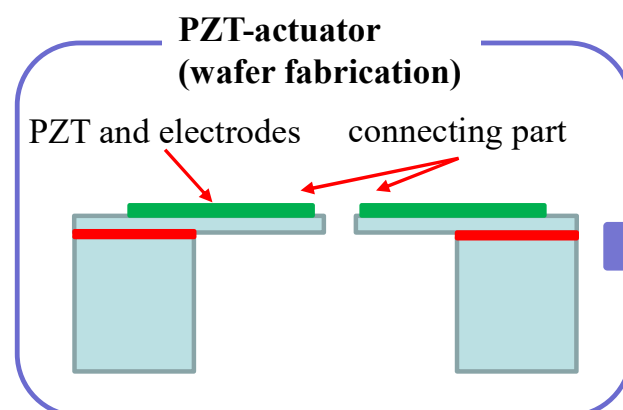
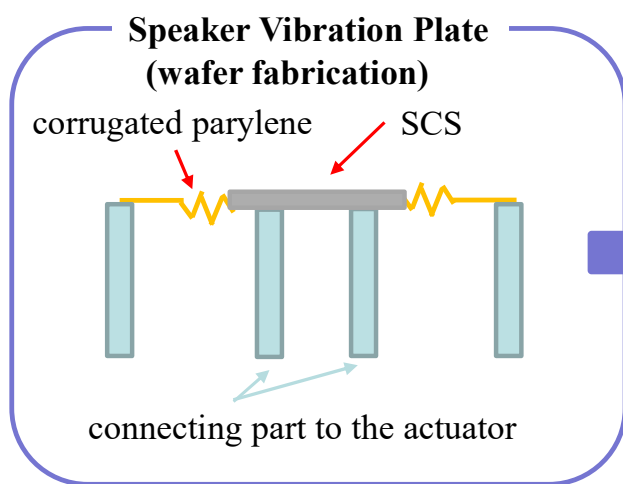


front side

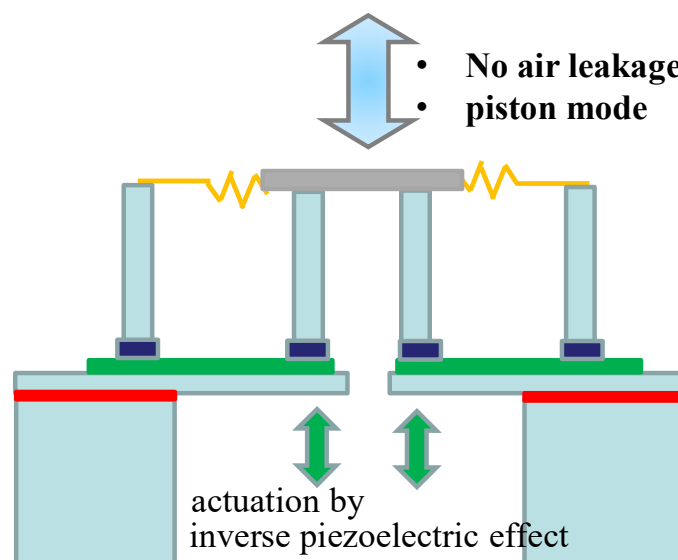


back side

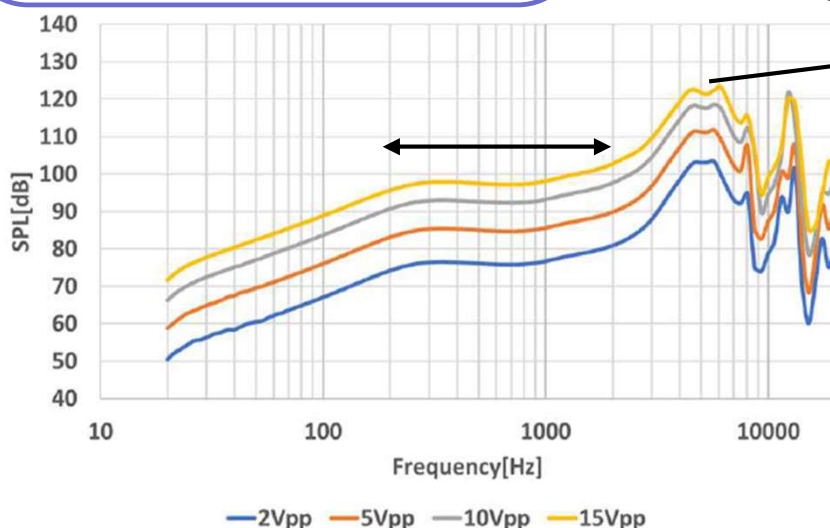
(b) composite vibration plate



integrating

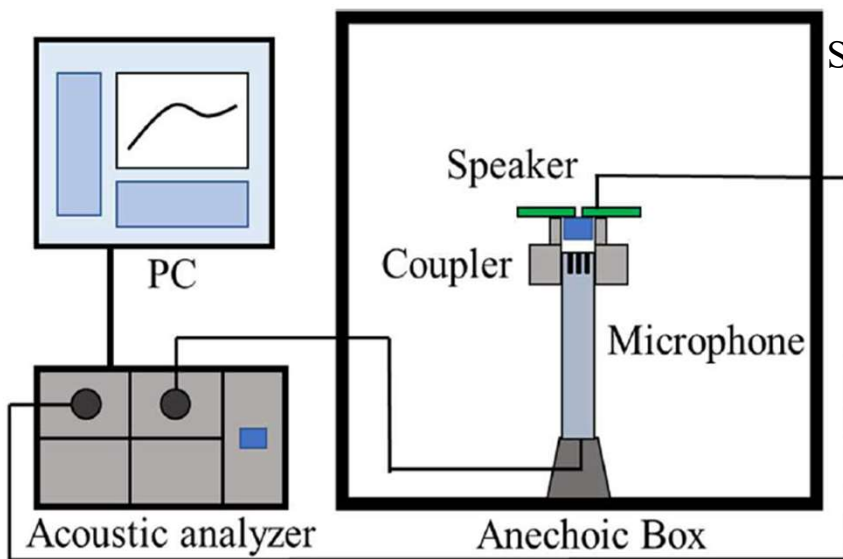


A true MEMS speaker with a Si-parylene composite diaphragm and a PZT actuator. The composite diaphragm is a closed form preventing air leakage and highly deformable by 10 μm thick parylene corrugation. The composite diaphragm and the PZT actuator were integrated.

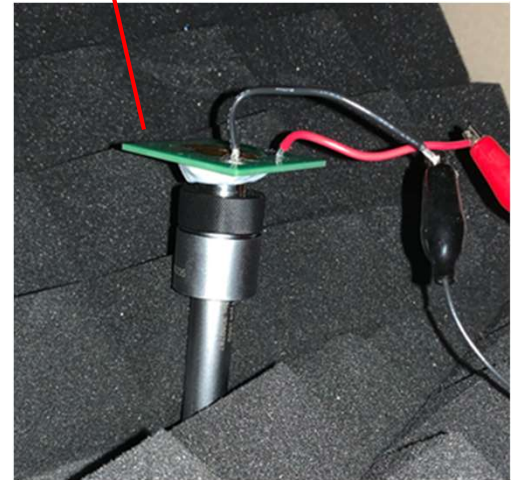


Maximum SPL higher than 120 dB

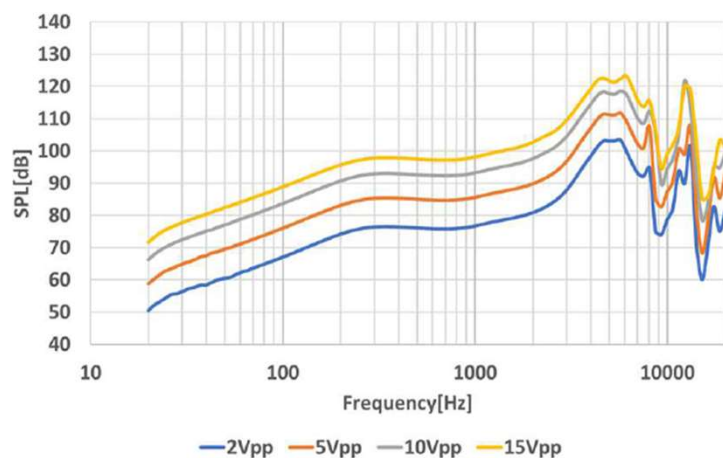
Flat SPL of 85 dB was generated between 200 Hz and 2 kHz



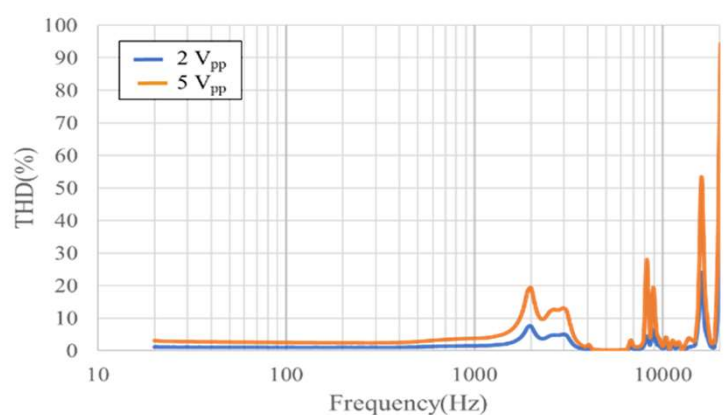
Speaker with PCB



In Ear Simulator Microphone with Ear coupler was attached the speaker. The speaker and the audio analyzer were connected and an AC voltage from the generator and a DC voltage for bias were applied.



(a) SPL(sound pressure level)



(b) THD(total harmonic distortion)

In the ear simulator environment, SPL (sound pressure level) higher than 120 dB was achieved at 4.2 kHz by applying 15 Vpp. And a flat SPL of in the region of 85 dB was generated between 200 Hz and 2 kHz by applying 5 Vpp. THD (total harmonic distortion) is almost smaller than 5% at a driving voltage of 5 Vpp.

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