

MSE-5: Design and Fabrication of 2D Titanium Carbide MXene Planar Magnetic Loudspeaker

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Problem Statement:

Current loudspeakers use copper and aluminum as the conductive material in the voice coil trace. Is it possible to reduce the weight by using a single layer of MXene?

Approach:

- Voice coil traces of varying geometries were designed and laser cut from DuraLar (boPET).
- MXenes, stored in dispersion, were sprayed onto the trace substrate.
- The impedances of the traces were measured and each trace was attached to an amplifier with an input signal.

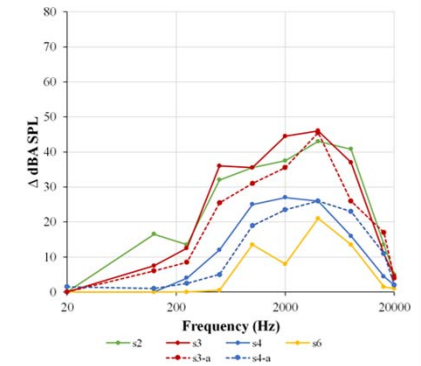
Discussion & Conclusions:

- Wider voice coil traces correlated with lower impedance, as more electrons could travel along the path.
- Longer voice coil traces correlated with higher impedance, as there was more material for electrons to flow through.
- Lower voice coil trace impedance values correlated with higher sound pressure level (SPL) outputs.
- Greater coil coverage on the diaphragm resulted in a more responsive sound pressure output.
- It has been demonstrated that MXene shows promise as a material for use in electroacoustic transducers.

Results:



Spray Coated MXene Coil Adhered to Diaphragm



Effect of Trace Length on Sound Pressure Level Output

- dB(A) SPL measurements were taken in an acoustically insulated room.

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