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## Tunable MEMS Devices

MEMS microphones have become very popular in commercialized products in recent years, and one of the greatest demands currently is for directionality. This requires that multiple microphones be matched with great precision, but there is generally some degree of mismatch even when the microphones are manufactured very carefully. Existing techniques for producing microphones with directionality consume significant amounts of power and have other various limitations.

Researchers at ASU have developed a technique for tuning the resonant frequencies of microphone membranes to compensate for any mismatch from fabrication and packaging. The method entails precise manipulation of the mechanical properties of the membranes to adjust their performance. This simple operation uses minimal power and is completely reversible.

### Potential Applications

The market for MEMS microphones is growing quickly due to the wide range of applications for advanced audio input technology. Their very small size and immunity to EM interference, among other advantages, are allowing them to gradually replace ECMs in many applications. The added feature of directionality will increase this advantage and expand the range of potential applications, which include the following:

- Hearing aids
- Cell phones
- Audio input in laptop computers, camcorders, PDAs, etc.
- Automobile hands-free calling
- Security applications

### Benefits and Advantages

- Low power consumption
- Reversible
- Debris-free
- Operation can be performed:
  - At room temperature
  - In-situ after packaging

