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New Microfabrication Technology for Producing Sensing Cells for MET Based Seismometer

Molecular Electric Transducer (MET) seismometer cells detect motion based on the movement of liquid electrolyte between electrodes. A MET sensing element consists of electrodes with spacers that are suspended across a narrow channel containing a liquid electrolyte. Holes through the electrodes allow electrolytes to flow along the length of the channel. The sensitivity of a MET sensor is often limited by its physical parameters, specifically hydraulic resistance caused by irregularity among the electrode layers. Current fabrication techniques require a more costly, focused-ion-beam (FIB) system and lack the precision needed to create a superior sensor.

Researchers at Arizona State University have developed a novel microfabrication process that produces MET sensing elements with more uniformity between electrode layers and enhances control over the device's size. This allows for sharper, more precisely aligned channels and increases the surface area of better isolated electrodes. The enlarged surface area and improved isolation intensify the sensitivity of the device and offer higher dynamic range. The structure itself is stronger, supporting a greater number of holes that lower hydraulic resistance and significantly soften the sensor's self-noise. A FIB system is not needed in fabrication, greatly reducing the production cost for manufacturers.

Potential Applications

- MET Seismometers
- Linear and Angular Accelerometers
- Geophones
- Semiconductor Surface Etching

Benefits and Advantages

- Durability – Greater shock tolerance supports more rugged application.
- Convenience –Angular independence makes field installation easier.
- Lower Costs – FIB system no longer needed in the fabrication process.
- Accuracy – Increased sensitivity, higher dynamic range, and reduced self-noise.

For more information about the inventor(s) and their research, please see Dr. Hongyu Yu's directory webpage