

Case ID:M14-216P

Published: 7/2/2015

Inventors

Lenore Dai

Hongyu Yu

Miranda Ngan

Mengbing Liang

Hai Huang

Contact

Shen Yan
shen.yan@skysonginnovations.
com

MET Based Accelerometer Using Ethylammonium Nitrate (EAN) Based Potassium Iodide Droplets as the Sensing Body

Molecular Electronic Transducer (MET) seismometer cells are inertial sensors which 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. These sensors have a broad range of applications, from seismology and aviation to consumer electronics. With the advent of smart electronic devices, a huge market is prompting further development to inertial sensors. Conventional MET cells use water based electrolytes as the sensing body. Water-based systems are limited by the freezing and melting points of water, making them unusable at extreme temperatures in harsh environments.

Researchers at Arizona State University have discovered a method of using ionic liquids (e.g. Ethylammonium Nitrate (EAN)) in place of water as the liquid electrolyte. Ionic liquids stay in the liquid state at a very wide range of temperatures and are very soluble. High solubility increases instrument sensitivity to vibration and improves performance. Sensors using ionic liquids are operable over a wider range of frequencies than standard technologies, and remain stable in harsh environments. Additionally, ionic liquids enable new structures based on MET technology, allowing MET seismometer cells to be designed for additional specific applications. A metal halide or compound such as potassium iodide can also be included. Inclusion of the metal halide can further increase the operational temperature range of the liquid, as well as vibrational sensitivity.

Potential Applications

- Personal Electronics
- MET Seismometers
- Linear and Angular Accelerometers
- Geophones
- Semiconductor Surface Etching
- Planetary Exploration/Seismology
- Aviation
- Source Detection

Benefits and Advantages

- Accuracy – Increased sensitivity to vibration and reduced self-noise.
- Harsh Environments – Broader range of liquid-phase temperatures increases possible applications.
- Specificity – Optional incorporation of metal halides such as potassium iodide.

For more information about the inventor(s) and their research, please see

[Dr. Lenore Dai's directory webpage](#)

[Dr. Hongyu Yu's directory webpage](#)