The Challenge

Thin film-based piezoelectric MEMS (pMEMS) sensors and devices are increasingly found in automotive, industrial, and personal electronic devices. Applications include PMUT-based fingerprint sensors and gesture recognition, MEMS microphones, and resonator-based chemical sensors. The capabilities and performance of these MEMs devices can be greatly enhanced by using scandium doped aluminum nitride piezoelectric films. These doped nitride films are typically manufactured by reactive sputtering of metallic alloy targets. However, a lack of high-quality aluminum scandium sputter targets has hindered the development and fabrication of next generation pMEMS.

The Solution

Materion has developed a melt-based process for producing aluminum scandium sputter targets with high chemical uniformity, low oxygen contents, and 3N purity. These alloys are specifically tailored for the reactive deposition of these nitride piezoelectric materials. Sputter targets are currently available with scandium contents of up to 30at%. Targets with up to 44at% (56wt%) Sc will be available in the near future.

THE ADVANTAGES OF MATERION AL-SC SPUTTER TARGETS

- Highly consistent chemical uniformity across the target and through the target thickness
- Purity >99.9% with low oxygen contents and low critical contaminant levels
- Tightly controlled microstructure for optimal sputter performance
- Vacuum cast, fully dense targets with adherent low target-to-target variability and low particulation
- Proven solution that’s the process of record and in volume production at multiple fabs worldwide