Functional composites for sensor applications

**Background**

Piezoelectricity

Pyroelectricity

Brittle, heavy ceramic sensors

Flexible, lightweight composite sensors

**Experiments**

Electrode

Particles

Polymer

Dielectrophoretic structuring

Macrostructure of the composite during DEP

**Simulations**

Structured polymer-ceramic composites for piezoelectric sensing applications outperform the conventional ceramics. The pyroelectric sensitivity of the composites enhances by DEP structuring.

**Test results**

**Conclusions**

Lead titanate-epoxy sensors prepared by dielectrophoresis show better piezoelectric and pyroelectric sensitivity compared to random composites. Significant improvement at low volume fractions leads to higher flexibility of the sensors. Lead titanate-PEO composites show enhanced pyroelectric properties compared to epoxy composites owing to the higher electrical conductivity of the polymer matrix.

**Publications**