

PiezoMEMS Technology



S&T Campaign: Materials Research
Tier 2 Subtopic

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Research Objective

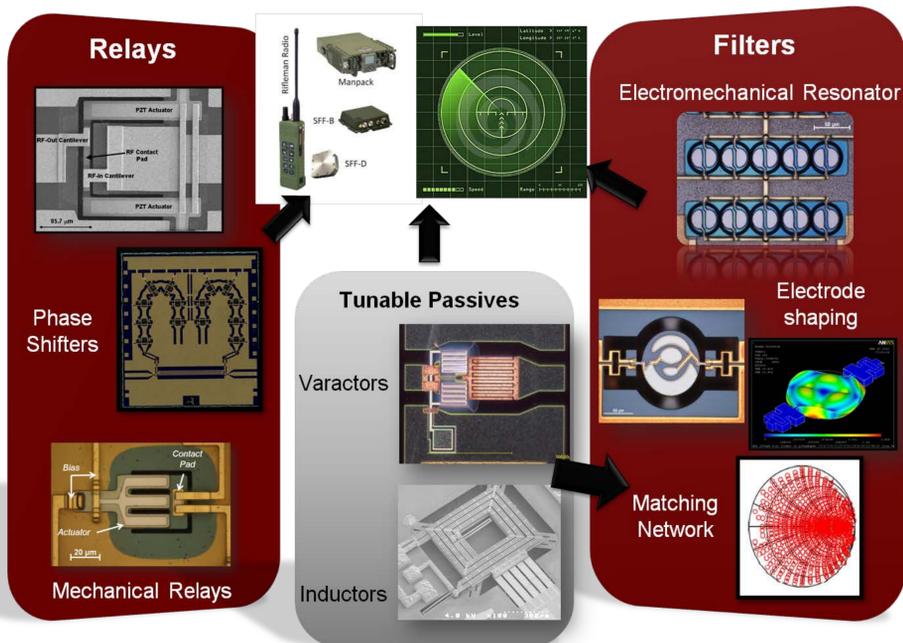
Establish an enabling PZT based MEMS technology
Explore the fundamental limits of materials optimization, processing development, and modeling of thin film PZT devices

Challenges

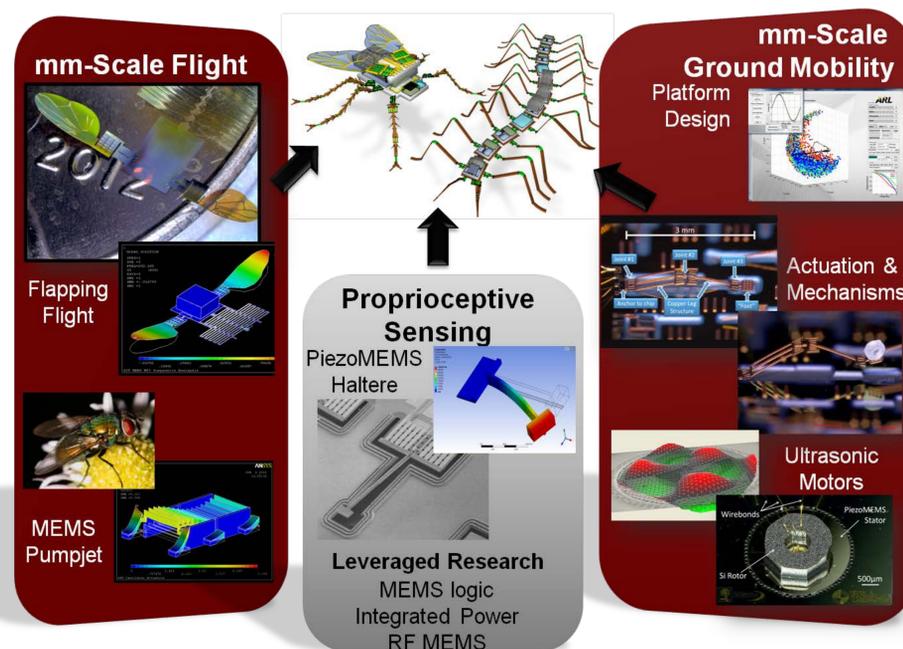
- Integration with CMOS and high aspect ratio metal MEMS processes
- Novel processing methods such as 3D conformal deposition techniques (e.g. ALD) and multi-layer piezoelectric stacks
- Tunable, frequency agile components and controlling substrate loss effects
- Integrated wafer level packaging

ARL Facilities and Capabilities Available to Support Collaborative Research

- Specialty Electronic Materials and Sensors Cleanroom (SEMASC) 15,000 ft² fabrication facility
- Only open R&D facility in US with full suite of material deposition, fabrication, device modeling, and characterization infrastructure and expertise
- RF MEMS characterization laboratory
- MEMS actuator characterization laboratory (high speed video, laser doppler vibrometer, probe stations, etc)



Applications include RF MEMS switches, resonators, filters, and tunable passives for secure communication and phased array radar systems



Applications include mm-scale robotics as a means to push the state-of-the-art in MEMS actuation, control and sensing

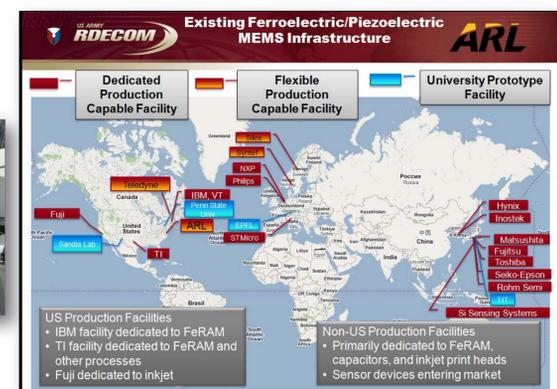


Sol-Gel Chemical Solution Preparation and Deposition

Endpoint Assisted Ion-Milling and Reactive Ion Etching



Automated CSD & Sputtering



Only flexible production capable facility in US

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- RF MEMS Design and Characterization
- Advanced PiezoMEMS Packaging
- System level integration