Company Overview

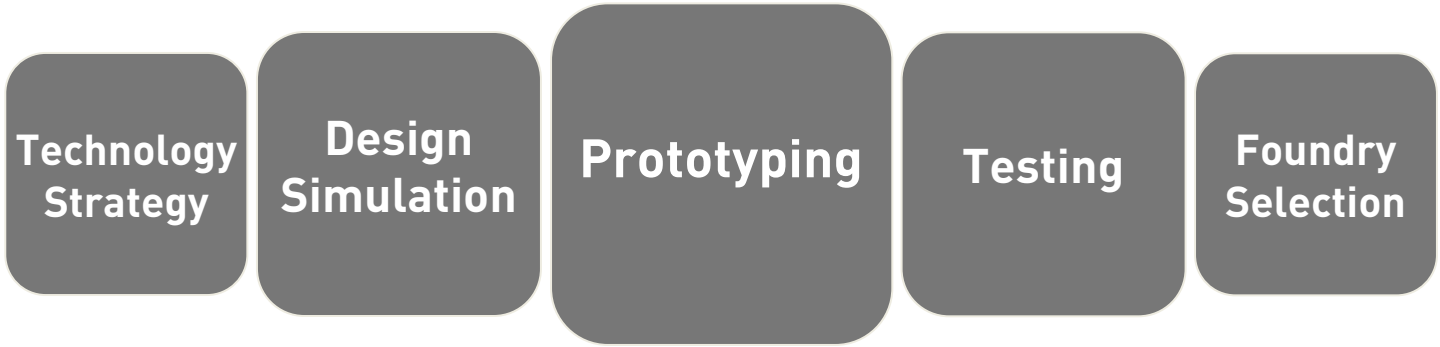
October 2010

AMFITZGERALD
& ASSOCIATES

Mission

We turn your ideas into silicon.

Fully integrated services: concept to foundry

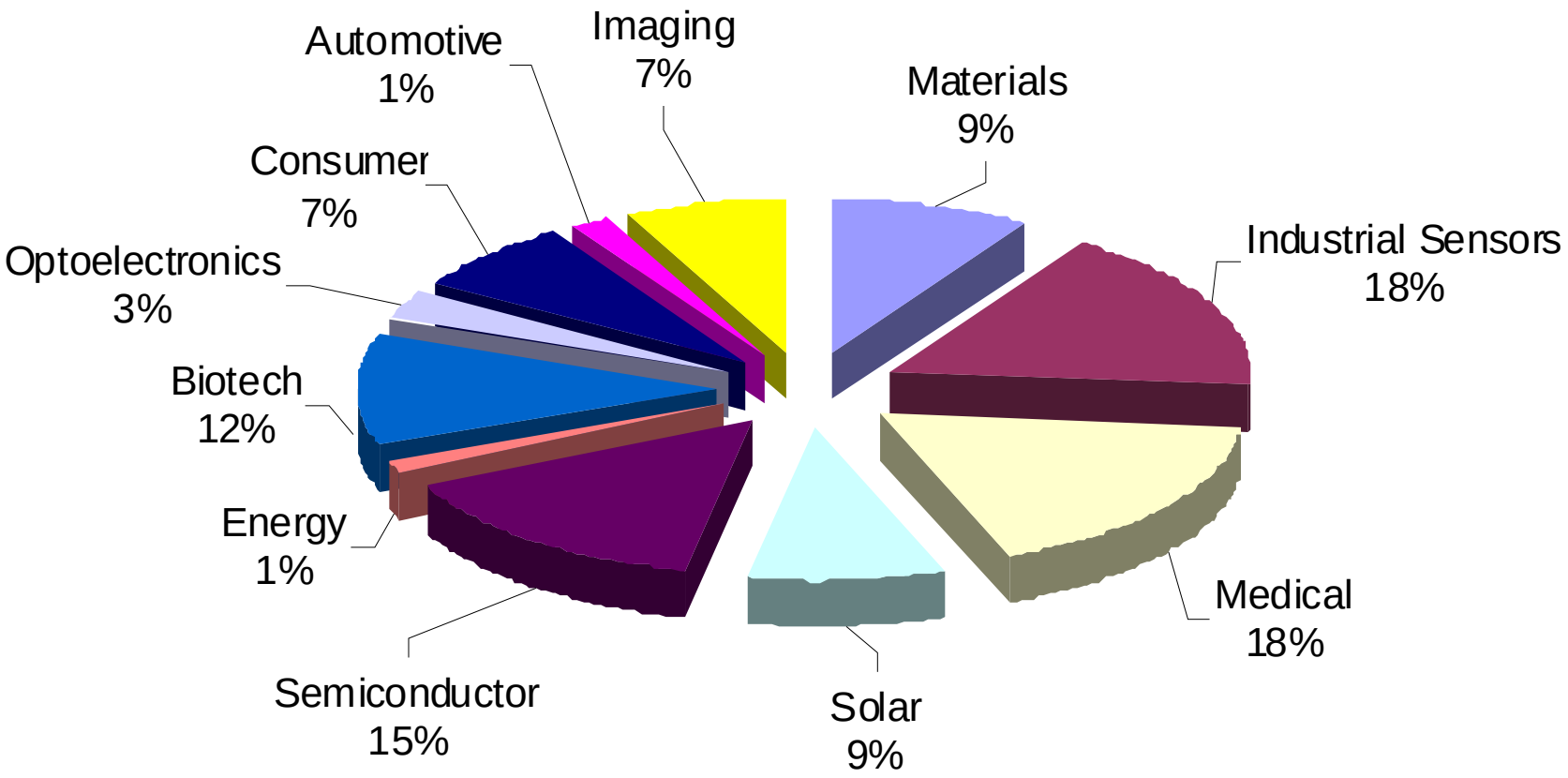


- Complete design and project management
- Feasibility and cost analysis
- Design optimization using simulation
- Process development on 100 mm or 150 mm wafers
  - Prototype fabrication with own staff engineers at UC Berkeley's Microlab
- Test system development
- Packaging, system integration
- Technology transfer to foundries for production

Primary value to clients

- Risk reduction during all phases of technology development
  - Idea evaluation without major funding or staffing commitment
  - Fast prototyping cycles enable accelerated development
  - Critical system design and manufacturability issues addressed early
  - Streamlined transition from R&D to foundry production
- On-demand, expert engineering team
  - Use as needed to bridge gaps
  - Real-world MEMS knowledge: all staff have at least three years of hands-on fab experience

Our diverse customer base



Detailed Technical Capabilities

MEMS design and process expertise

Technologies we have developed:

- Piezoresistive devices
- Piezoelectric (AlN and ZnO) devices
- Electrostatic structures
- Solar cells
- Passive microfluidics
- Electrophoretic pumps
- Mold masters
- Gratings, phase shift lenses etc.
- PDMS, SU-8 structures
- Mechanical dummies for package reliability testing
- Custom test systems

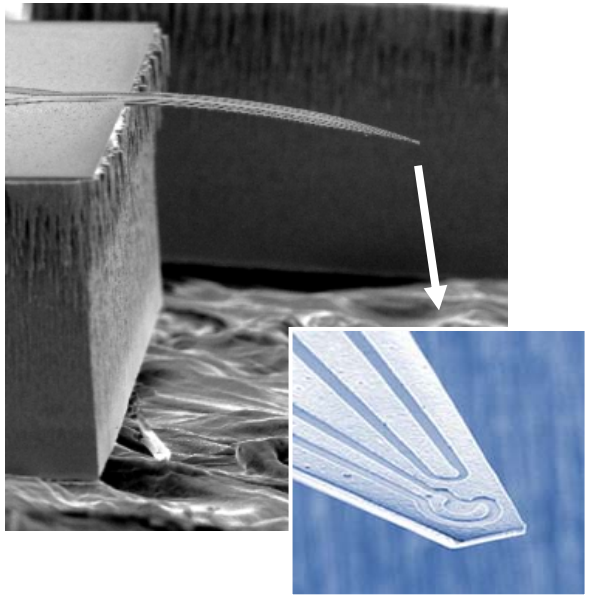
Over 70 clients served

Application areas:

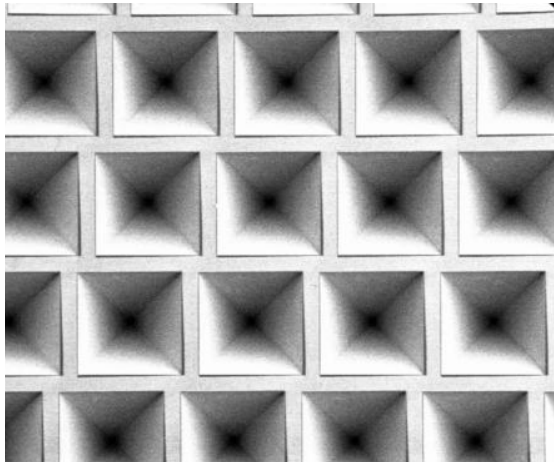
- Chemical sensing
- Materials characterization
- Medical implant
- Medical diagnostics
- Pressure sensing
- Filtration products
- Laser/ Infrared/ Visible optics
- Chip cooling
- Cell culture
- Radiation sensing
- Microphones
- Gas flow metering
- Multi-chip modules
- Solar

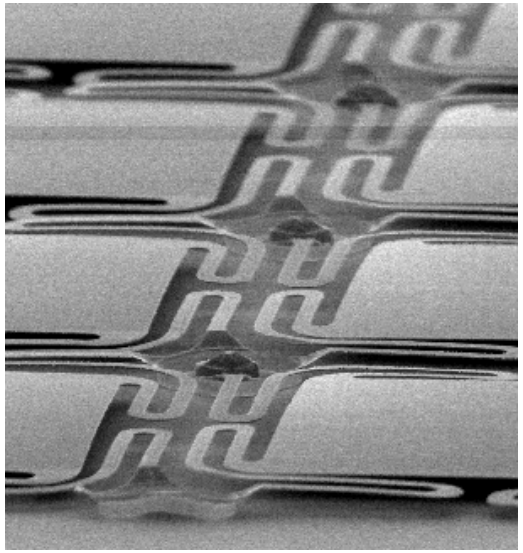
Product development gallery: some examples

Customized micro-cantilevers

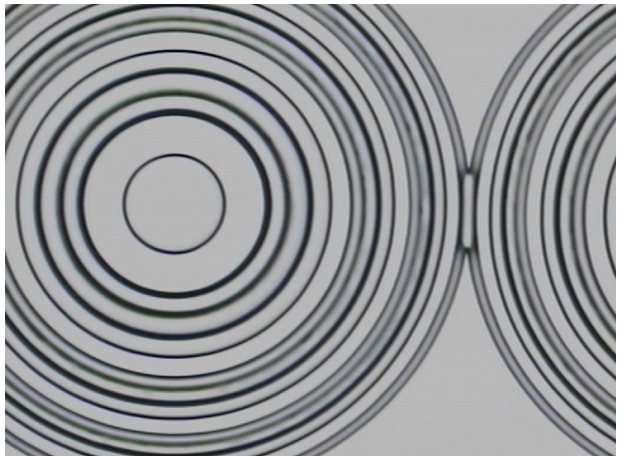


Pyramidal crystal planes left by KOH etch





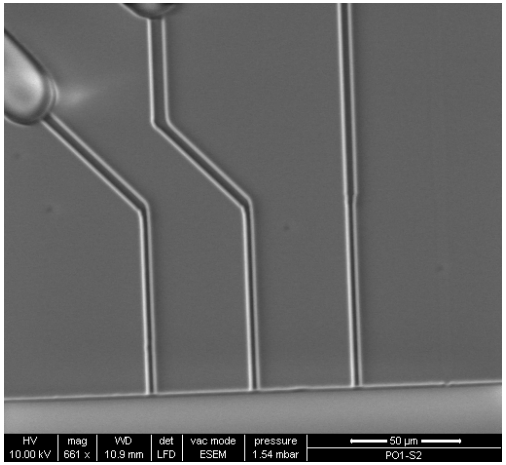
Infrared imaging pixels: MEMS over CMOS

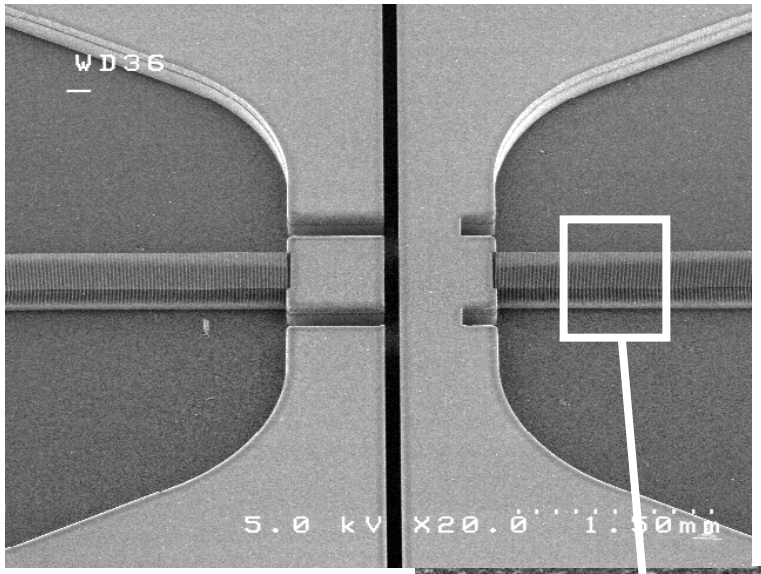


Silicon acoustic lenses

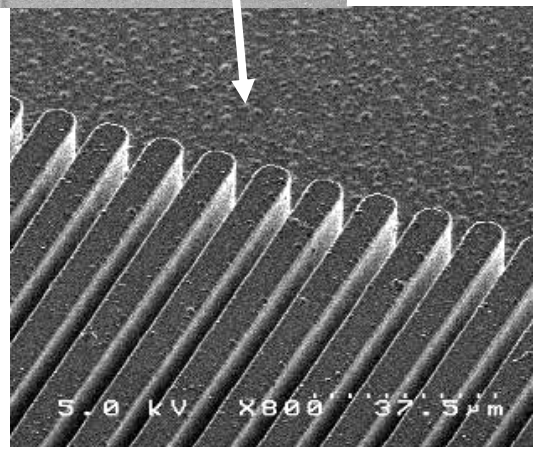
Product development gallery: some examples

Fluxion Biosciences: Micro-channels for cell patch clamping

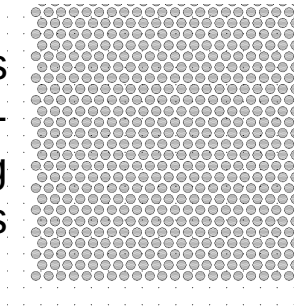




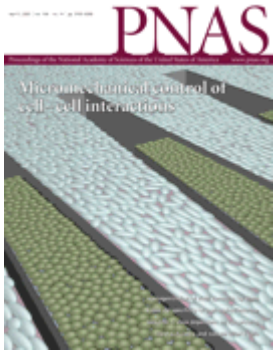
Wave80 Biosciences: Microfluidic chip for rapid HIV analysis



Mold masters for micro-texturing polymers



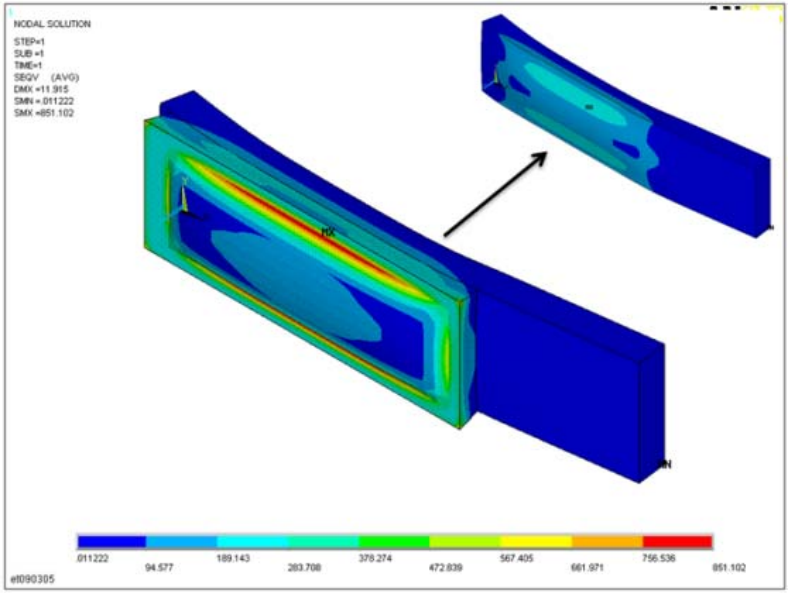
MIT/Bhatia Lab: cell culture platforms



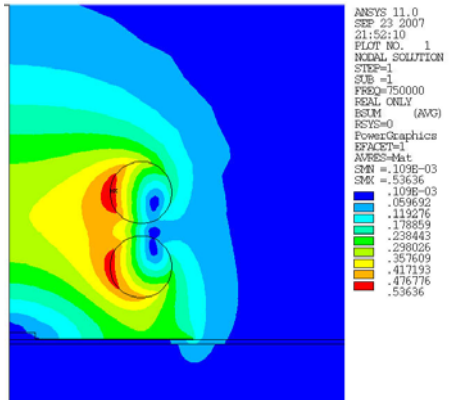
Modeling and design optimization

- ANSYS Multiphysics R12
- Matlab
- Proprietary fracture prediction

- Intelligent use of simulation to minimize risk and reduce fab cycles
  - Management of uncertainty in MEMS material properties
- Design exploration and performance optimization



Package-induced stresses

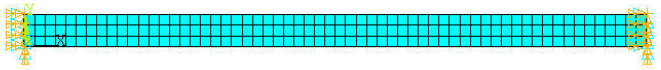


Magnetic field of inductor coils

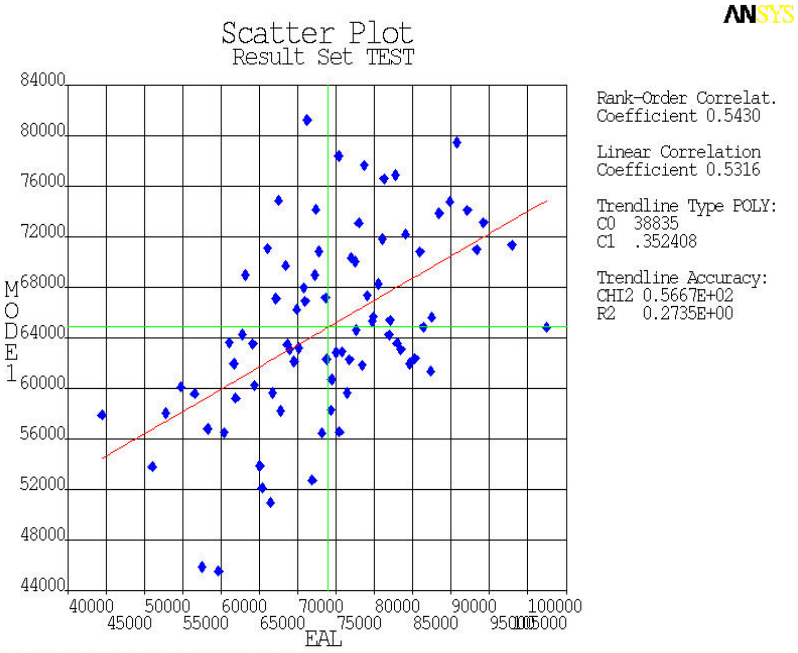
Modeling expertise

- Basic and coupled physics interactions
- Static, harmonic, transient analyses
- Residual stress effects
- Non-linear material behavior
- Squeeze film damping
- Contact analysis
- Parameter variational analyses (“six-sigma”)
- Design for cost, performance, quality
- Multiple criteria optimization
- Development for custom pre- and postprocessors

Example: Process variations in RF switch



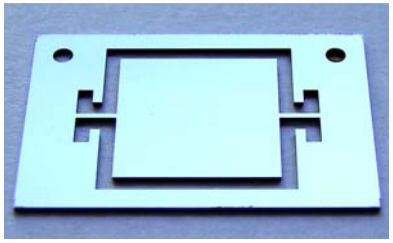
Resonant frequency vs. height, width, thickness, material property variations

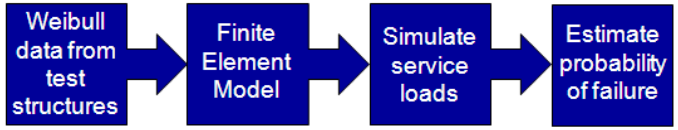


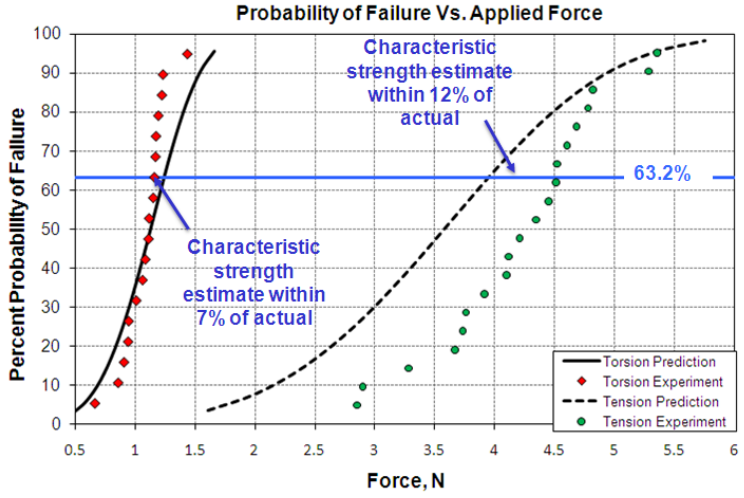
Device reliability simulation

- Identifies where and when a device is most likely to break
- Informed design
- Reduction of time to market: fewer design, fab, test cycles required
- Process IP stays secure: fabrication and fracture of test samples is all that's needed

Industry-leading fracture prediction

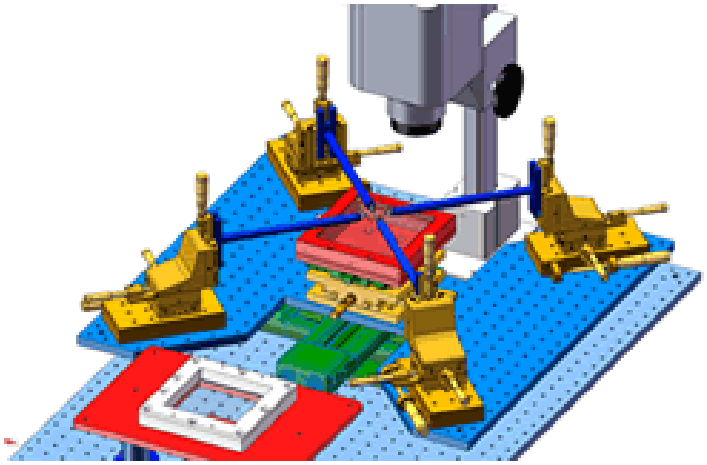




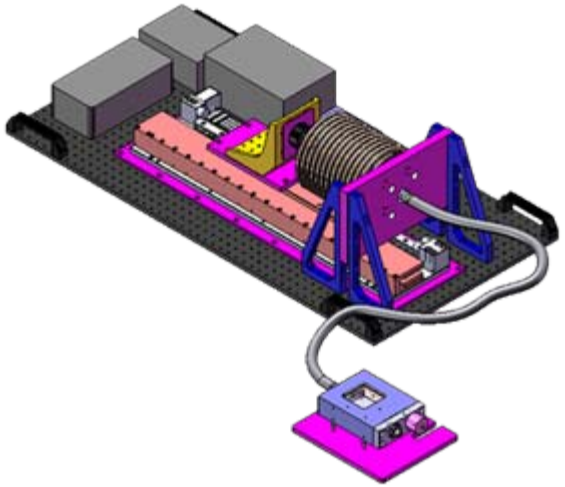


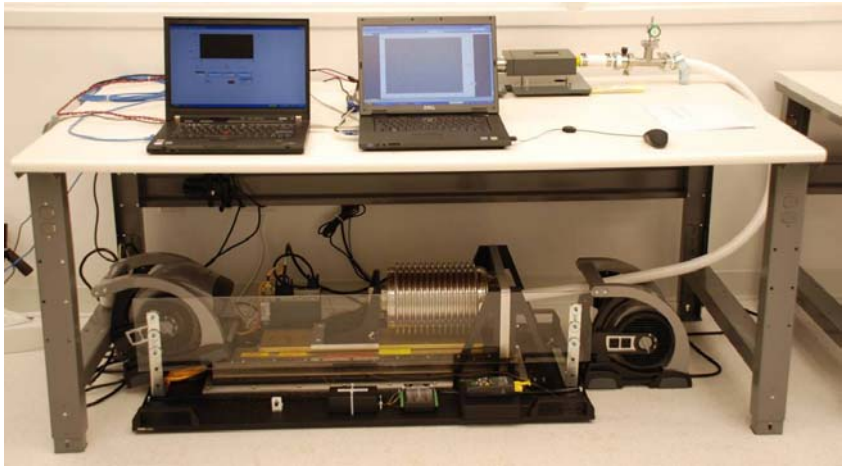
Custom test systems

Micro-positioning stage with electrostatic chuck and stereomicroscope



Dynamic pressure test chamber

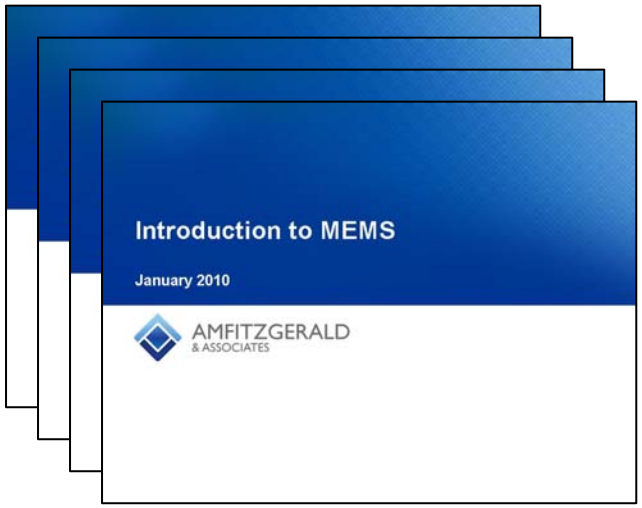




Technology strategy

- Device feasibility
- Manufacturing cost models
- Technology readiness
- Patent landscapes
- Development roadmaps
- Due diligence

Customized workshops on MEMS



Client engagements

- Initial meeting to assess fit and to discuss scope of work
- Detailed cost proposal provided, time and materials
- Project performed in discrete Phases to minimize risk
  - Phase 1: Design exploration
  - Phase 2: Prototype fabrication
- Client owns all work product and intellectual property
  - Including masks and runsheets, which can be transferred to foundries

Public client list

Startups and Small-Medium Businesses:

Advanced Diamond Technologies
Bay Materials LLC
Cantimer, Inc.
Edge Embossing LLC
Endotronix
Fluxion Biosciences
Hepregen
Microfabrica
Micralyne
NeuroPro Technologies
Nevada Nanotech Systems
NovaSpectra
Owens Technology
SemQuest
Silicon Light Machines
Silicon Microstructures
Solus Biosystems
SVTC Technologies
Trident Metrology
Wave 80 Biosciences

Public Companies:

Agilent Technologies
Applied Materials
Caliper LifeSciences
Cypress Semiconductor
Panasonic ACOM-TC
Ricoh Innovations
Sun Microsystems

Research Institutions:

DARPA
MIT
Stanford University
Stowers Institute
UCSF, Opthalmology
University of Nevada, Reno

Company summary

Founded 2003

700 Airport Blvd. Suite 210
Burlingame, CA 94010, USA
Phone: +1 (650) 347 MEMS
Fax: +1 (650) 347 6366
E-Mail: info@amfitzgerald.com

MEMS Development

Dr. Alissa Fitzgerald
Dr. Carolyn White
Brent Huigens
Dawn Hilken

Modeling and Optimization

Dr. Alissa Fitzgerald
Dr. C.T. Kao
Dr. David Pierce

Strategy

Dr. Alissa Fitzgerald
Dr. Carolyn White
Dr. C.T. Kao

AMFITZGERALD
& ASSOCIATES