

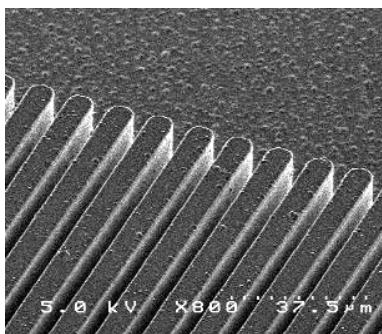
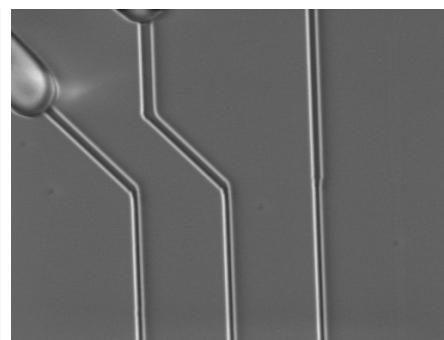
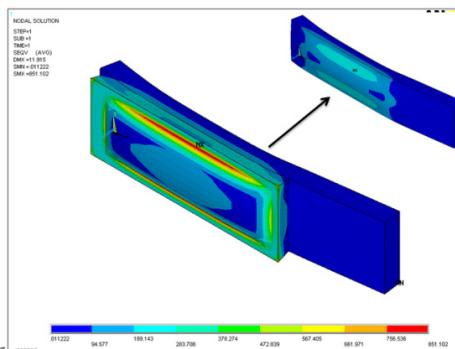
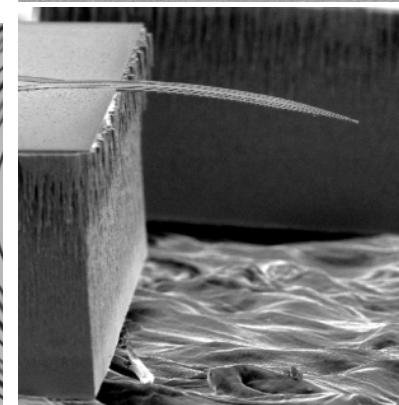
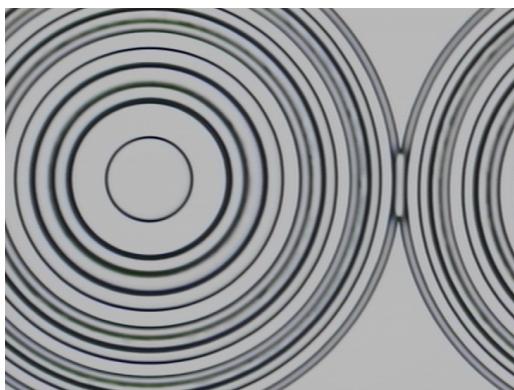
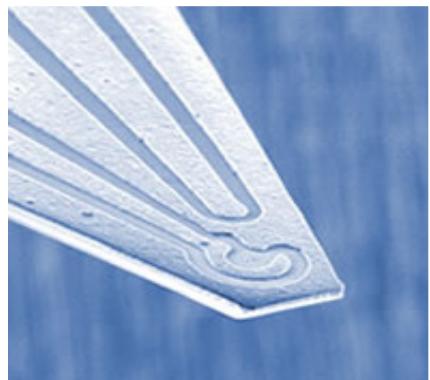
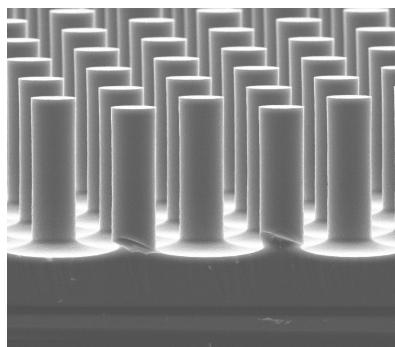
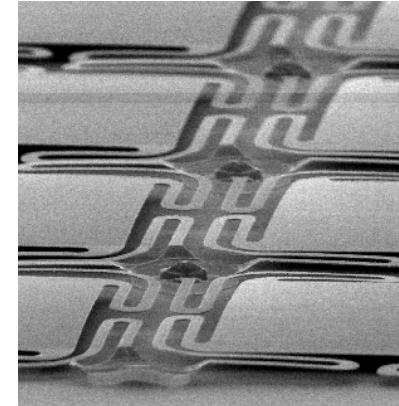
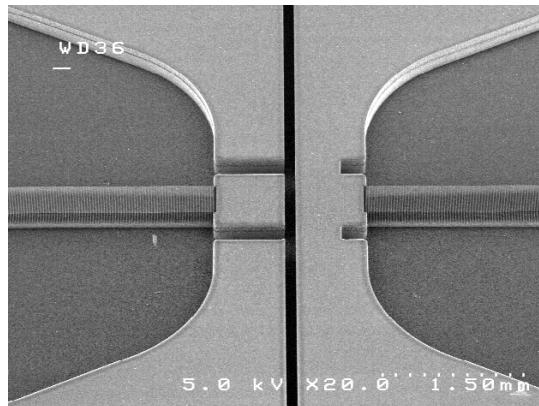
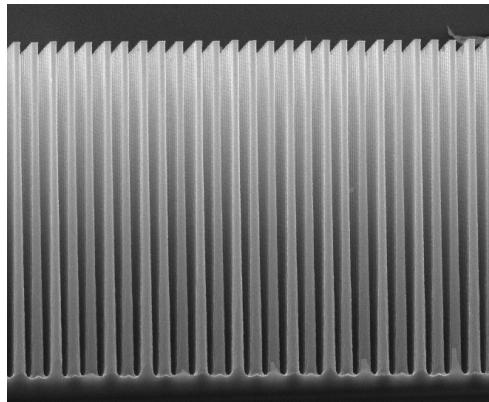
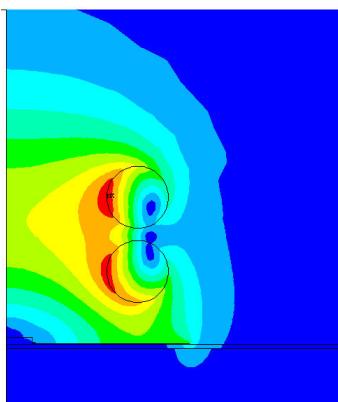
AMFitzgerald Company Overview

June 2012



AMFITZGERALD
& ASSOCIATES

Mission: Your Partner in MEMS Product Development



Company background

- **Founded 2003 by Alissa M. Fitzgerald, self-funded**
- **Burlingame, CA: near SFO and Silicon Valley**
- **Goal: become the premier MEMS product development firm**
- **Consistent growth**
 - Over 100 clients served to date
- **Active member of the MEMS Industry Group**



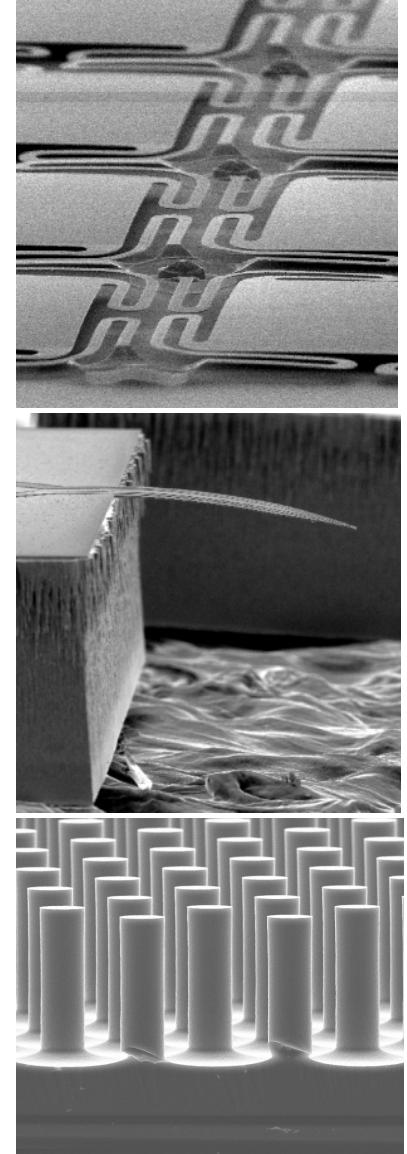
Headquarters in Burlingame, CA



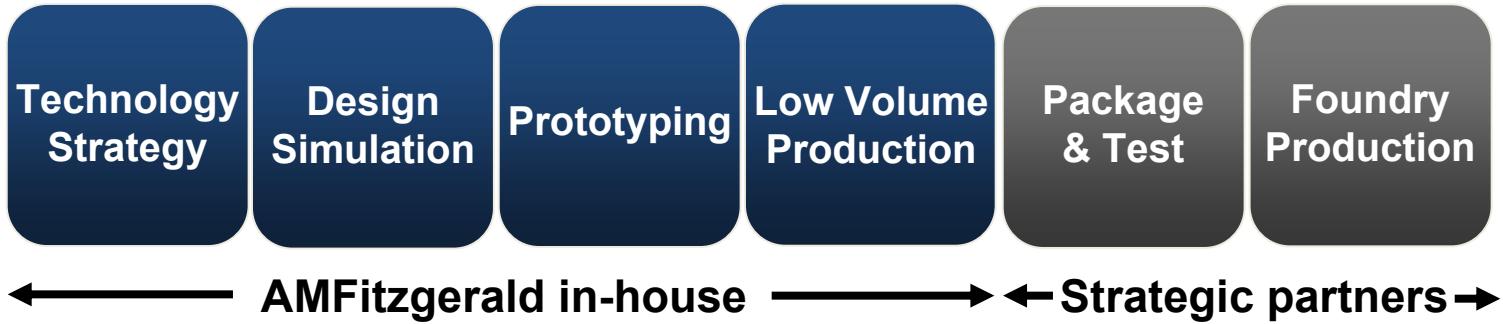
Fab operations at UC Berkeley
Marvell Nanolab

Our value

- **First time developing MEMS?**
 - We can provide the complete solution
- **Improving your MEMS product?**
 - Let us optimize your design
- **Investing in MEMS?**
 - Valuable insight from expert practitioners
- **Our competitive advantage**
 - A complete MEMS solution
 - Expert design and process engineers



A complete solution from concept to production



- **Project management**
- **Multi-disciplinary engineering team**
- **In-house prototype fabrication (150 mm wafers) by our engineers, not operators**
- **Smooth transition to production partners**
- **Leverage our supplier ecosystem**

Solutions beyond R&D

A menu of production options for different customer needs

Full custom
low volume



AMFITZGERALD

*Open search
for foundry
partner*

Full custom
high volume

*Open search
for foundry
partner*

Faster time to
market with
foundry-specific
design

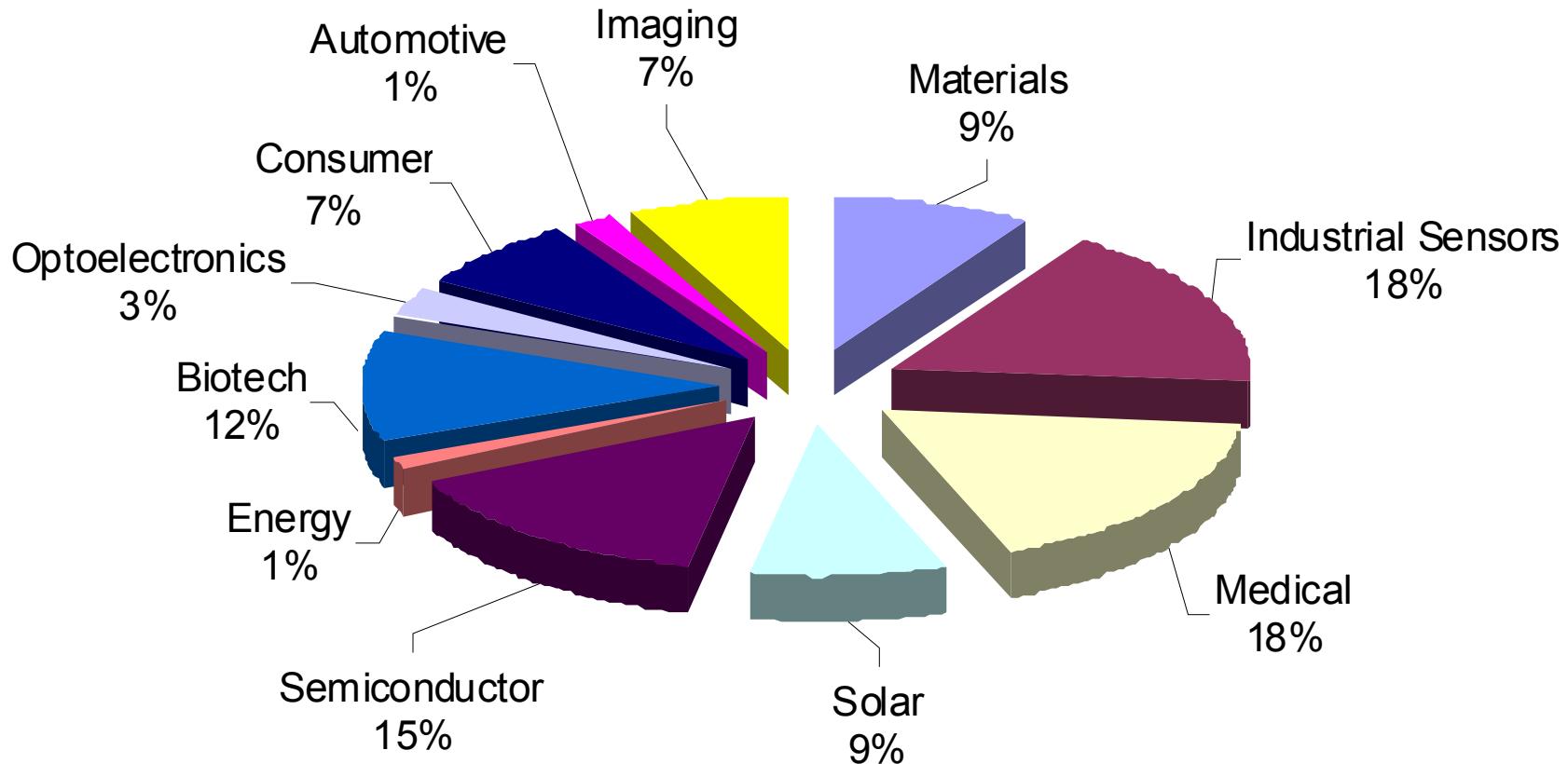
micralyne

silex
MICROSYSTEMS

Fastest time to
market with
standardized
200mm process

InvenSense
Innovation in MEMS

Our diverse customer base



MEMS type core competencies

- **Sensor types**
 - Motion, pressure, acoustic, infrared, magnetic, radiation, resonators, chemical
- **Transduction principles**
 - Piezoresistive, piezoelectric, electrostatic, capacitive
- **Actuators**
 - Electrostatic, piezoelectric
- **Microfluidics**
- **Micromolds and surface texturing**

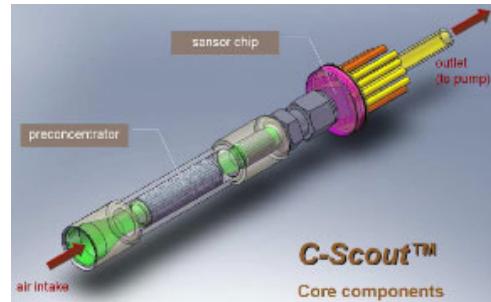
AMFitzgerald Client Products



Cantimer OSMO Dehydration Sensor



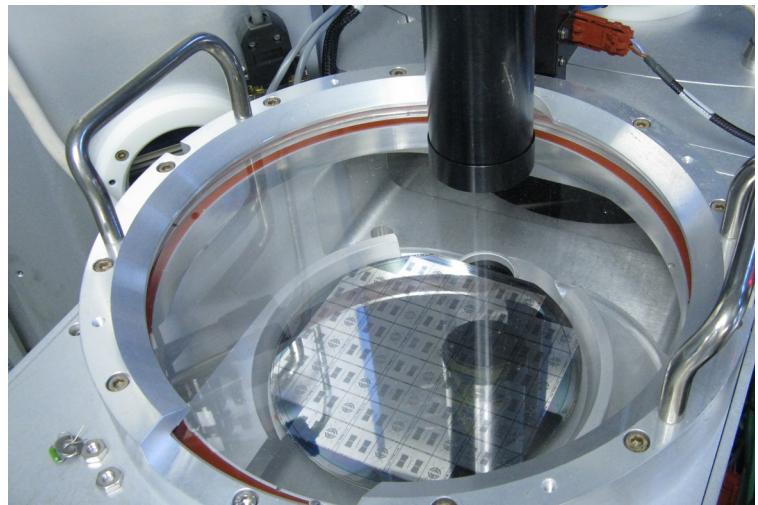
Fluxion Biosciences BioFlux product



NNTS C-Scout product

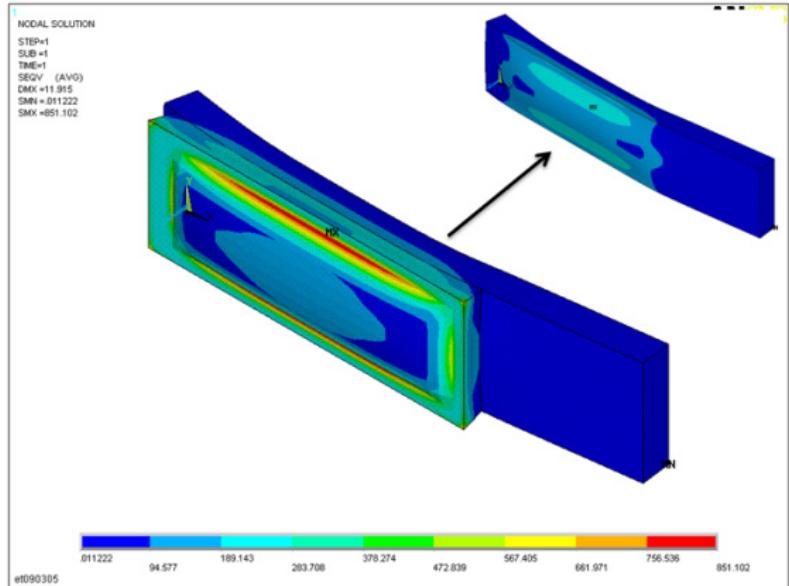
MEMS process core competencies

- All MEMS process techniques
- Process specialties:
 - Thick lithography
 - High aspect ratio silicon etch
 - Sacrificial release by vapor HF or XeF₂
 - Aluminum nitride and other new materials
 - Silex Sil-Via TSV
 - Laser and abrasive drilling
 - Stealth dicing
- Managing risk and uncertainty of MEMS R&D

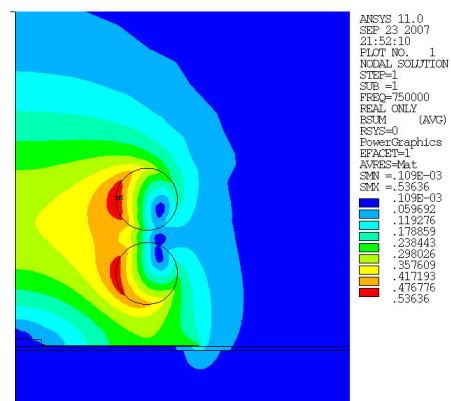


MEMS design core competencies

- ANSYS Multiphysics R13
- Tanner EDA L-Edit
- Matlab
- Proprietary fracture prediction
- Intelligent use of simulation to minimize risk and reduce fab cycles
 - Management of uncertainty in MEMS material properties



Package-induced stresses



Magnetic field of inductor coils

Business process

- Initial meeting: fit and scope of work
- Detailed cost proposal provided
- Project performed in discrete Phases to minimize risk
 - Phase 1: Design exploration
 - Phase 2: Prototype fabrication 1
 - Phase 3: Test and design iteration
 - Phase 4: Prototype fabrication 2
 - Etc.
- ***Client owns all work product and intellectual property***
 - Including masks and runsheets, which will be transferred to foundries

The secrets to MEMS development success

- Have adequate funds and timeline for multiple prototype iterations
- Robust designs do not push process tolerances
- Bring only mature prototypes to foundry

Public client list (partial)

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, Ophthalmology
University of Nevada, Reno

Company contact information

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