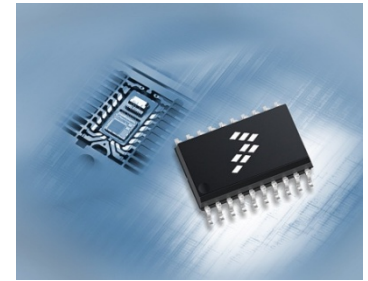


MEMS Market Opportunities and Developments from a US Perspective

Karen Lightman
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MIG

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www.memsindustrygroup.org

Hannover Messe US MEMS Day
05.April.2011



My presentation today



- Introduction of MEMS Industry Group (MIG)
 - Overview of MIG Programs/Events
 - Upcoming events
 - Highlight of MEMS testing research and analysis

- MEMS Market Opportunities and Developments
 - Overview of world market
 - US Market overview, strengths and growth trends
 - Conclusions

- Introduction of MEMS Day Presenters:



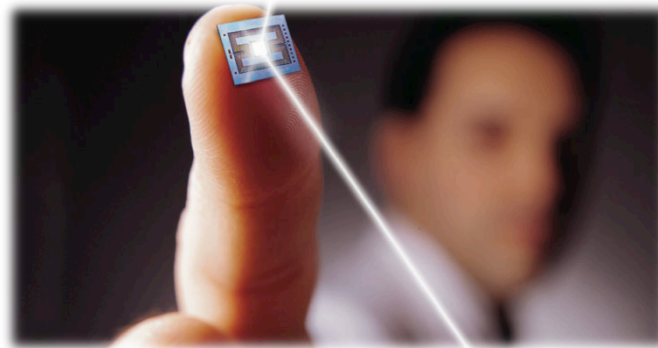
MEMS Industry Group (MIG)

Introduction



MIG is the trade association advancing MEMS across global markets.

Over 100 members and partners – from start-ups to Fortune 500 companies – MIG members ARE the MEMS supply chain.



MEMS Industry Group Members



ABI Research	EPCOS Netherlands	MEMSCAP	Radant MEMS
Acuity Incorporated	Eric Levy-Myers	MEMS Park Consortium	Rapid News Corp.
Acutronic USA	EV Group	MEMS Exchange	Robert Bosch
AEPI Grenoble-Isere France	Fab Owners Association	MEMS Foundry Itzehoe GmbH	Rite Track
Economic Development Agency	Fraunhofer ENAS	MEMS Investor Journal	Sand9
All Sensors	Fraunhofer IPMS	MEMStaff Inc.	Semefab Ltd.
A.M. Fitzgerald & Associates	Freescale Semiconductor	memsstar	SEMI
Amerimade Technology	GE Global Research & GE	MEPTEC	Semiconductor Support Services Co.
Analog Devices	Sensing	Micalyne, Inc.	Siargo, Inc.
ANSYS	GLOBALFOUNDRIES	MicroGen Systems	Silex Microsystems
Applied Supplier	HP	Micromachine Center	Small Times
Applied Microstructures	Honeywell	Microvision	SoftMEMS
Asia Pacific Microsystems	IMEC	Midwest MicroDevices	SPP Process Technology
Automation & Robotics Research Institute (ARRI)	Innovative Micro Technology (IMT)	Movea	Systems (SPTS)
Avago Technologies	InnovoSource	Nanoshift	SUSS MicroTec
Baolab Microsystems	Intel Corporation	NIST	SVTC Technologies
Brewer Science	Intellisense Supplier	Nokia	t4mation
Bullen Ultrasonics	Institute of Microelectronics	OEM Group	Tecnisco
Chipworks	InvenSense	Okmetic Oyj	Texas Instruments
ClassOne Equipment	iSuppli	Omron	TRONICS
Clement Lo Consulting	IVAM	Optical Associates Inc	VirtualFabs, Inc
Coventor, Inc.	Kilbrydon Consulting	Oxford Instruments	VTI Technologies, Inc.
CSR	Kionix	Pinyen Lin	XACTIX
Cymbet	Knowles Acoustics	Plasma-Therm LLC	XSens
DALSA Semiconductor	Lam Research Corporation	Plan Optik AG	WiSpry, Inc.
DelfMEMS	Leti	Plures Technologies	Yield Engineering Systems
Discera	Maradin Technologies Ltd.	Polytech GmbH	Yole Développement
Draper Laboratory	Maxim Integrated Products	Potomac Photonics	
Endevco MEMS	MEI LLC	Primaxx, Inc.	
		Proteus Biomedical	

What We Do



Educate the Marketplace

- Explain why MEMS is important and how it's being used

Encourage Information-sharing

- RSS news feeds, MEMSblog, Twitter, LinkedIn, YouTube, and newsletters
- MEMS Marketplace, one-stop matchmaking portal for MEMS supply chain and their customers

Share Resources

- White Papers, Industry Data, Presentations
- Membership Directory
- Introductions
- Webinars, workshops and networking

MIG – Upcoming Events



- “Integrating MEMS with DSP/Microprocessors” Industry Panel – Embedded Systems Conference
May 4, 2011 – San Jose, CA
- MEMS Pavilion, Conference Tracks and Pre-conference Symposium at Sensors Expo & Conference
June 6–8, 2011 – Rosemont, IL
- Quality of Life Enabled by MEMS Symposium
June 14, 2011– Microtech, Boston, MA
- “The Future of MEMS: Solutions for Moving from a Niche to a Mainstream Business”
July 12–14, 2011 – SEMICON West, San Francisco, CA
- MEMS Executive Congress – November 2–3 – Monterey Plaza Hotel and Spa

Main theme: MEMS in the Mainstream

- November 2–3, 2011
 - THE annual event that connects the MEMS supply chain to end-users of MEMS technology.
 - Keynote Speakers
 - Panels – OEMs
 - Networking
 - Meet the Press (members-only)
 - Exchange Ideas
 - Focused on growing the MEMS market globally and into adjacent markets
 - www.memscongress.com
- Panels
 - MEMS Market Analysts
 - MEMS Foundry Models
 - MEMS Everywhere – Sensor Networks
 - MEMS/Consumer and Software
 - MEMS Everywhere – A Technology Showcase



MEMS Blog



MIG members blog on all things MEMS –
www.memsindustrygroup.org/blog

MEMS blog

Search

SEARCH

Email Subscription

Enter your email address to
subscribe to this blog and
receive notifications of new
posts by email.

SIGN ME UP

Archives

M2M Forum Wrap Up

March 28, 2011 – 8:27 pm

Last week, MEMS Industry Group held its annual members meeting, M2M (Member-to-Member) Forum at the Doubletree San Jose Hotel. Not only did we change the name of the event to better represent the purpose of the meeting, idea exchange among members, we celebrated a milestone of which we are very proud. MIG is 10 years old!



MEMS Education Series



- ▶ www.memseducationseries.com

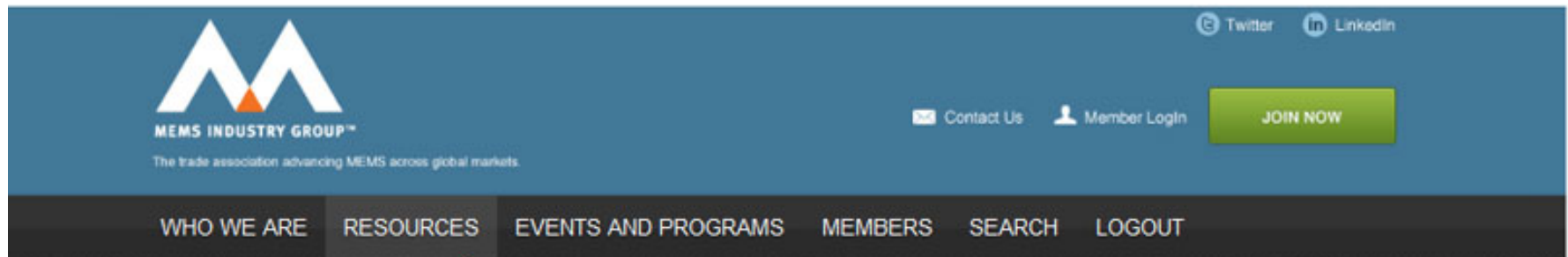
- ▶ Webinars – materials available on the MIG web site
 - Working with a MEMS Foundry | Part 1: How to Select a Foundry Partner
 - MEMS Manufacturing Evolution : What Will Change? (Yole)
 - Consumer MEMS: The Sky is the Limit (iSuppli)
 - MEMS Marketing 101: Why Products Beat Technologies in All Markets (t4mation)
 - Apple iPhone 4 Smart Phone – Teardown to the Silicon

- ▶ Upcoming webinars on working with a foundry, outbound marketing for MEMS and more!

MEMS Foundry Engagement Guide



www.memindustrygroup.org



Home > Resources > Foundry Engagement Guide

Step 1: Select Resources

Foundry Engagement Guide

Resources

[Resource Library](#)

[What is MEMS?](#)

[MEMS in the Machine](#)

[MEMS News](#)

[MIG Newsletter](#)

[Blog](#)

[Careers in the MEMS Industry](#)

[MEMS Marketplace](#)

[Foundry Engagement Guide](#)

Step 2: Select Foundry Engagement Guide

The MEMS Foundry Engagement Guide is a "How-To" guide for companies looking for MEMS foundry services; to better connect the MEMS supply chain. This is a joint effort of MEMS Industry Group members and was initially released in January, 2011.

The guide is written in wikia format and may be edited by the MEMS community. It includes the following sections:

- [Background Information](#)
 - [MEMS Foundries vs. Semiconductor Foundries](#)
 - [Differences between MEMS fabrication compared to IC fabrication](#)
 - [Different Types of Foundries](#)
 - [Product Maturity Levels](#)
- [How do you know when you are ready to approach a foundry and how to start the conversation?](#)
 - [A self-evaluation checklist](#)
 - [Starting a Conversation with a Foundry](#)

MEMS Marketplace

Your searchable guide to the MEMS supply chain.

[VIEW MARKETPLACE](#)

Membership Brochure



MEMS Marketplace



www.memsmarketplace.com

- ▶ An online portal that serves as a matchmaker for companies in the entire MEMS supply chain, from material suppliers to OEMs

The screenshot shows the MEMS Marketplace website interface. At the top, there is a dark blue header with the MEMS Industry Group logo on the left, the date 'THURSDAY, FEBRUARY 12, 2009' in the center, and a 'LOGIN' link on the right. Below the header is a large banner image showing a close-up of a MEMS device structure. The main content area is divided into two columns. The left column contains a navigation menu with links for 'ABOUT MIG', 'ABOUT MEMS TECHNOLOGY', 'CAREERS', 'EVENTS', 'MEMBERS ONLY', 'MEMBERS LOGIN', 'Create New Account', 'Membership Updates', 'MEMS Discussion Forum', 'MIG Research Portal', 'Industry Statistics', 'Case Studies', 'Articles, Papers and Presentation Materials', and 'Call for Authors/Papers'. At the bottom of this column is a 'MEMBERSHIP INFO' link. The right column is titled 'MEMS MARKETPLACE - PRODUCT SEARCH' and contains a search form. The form includes a 'Category Browse' link, a 'Product Search' link, a 'Company Search' link, and an 'Industry News' link. Below these links is a text box with instructions: 'Select as many or as few search criteria as you would like, then click the "Search" button. You can also search for a distributor or a manufacturer.' The search form has four input fields: 'Category' (a dropdown menu with '- Structured Wafers and Substrates' selected), 'Manufacturer' (a dropdown menu), 'Model' (a text input field), and 'Details/Features' (a text input field with 'SOI' entered). A 'Search' button is located below the input fields.

MEMS INDUSTRY GROUP THURSDAY, FEBRUARY 12, 2009 LOGIN

MEMS MARKETPLACE - PRODUCT SEARCH

[Category Browse](#) [Product Search](#) [Company Search](#) [Industry News](#)

Select as many or as few search criteria as you would like, then click the "Search" button. You can also search for a [distributor](#) or a [manufacturer](#).

Category: - Structured Wafers and Substrates

Manufacturer:

Model:

Details/Features: SOI

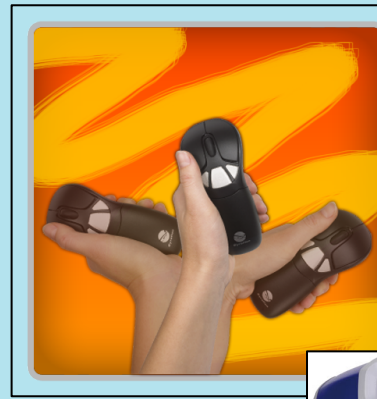
Search

MEMBERSHIP INFO

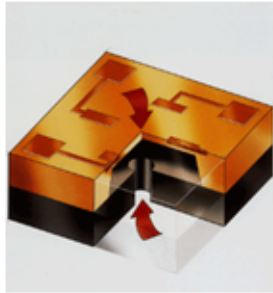
Introduction – US MEMS Market

- ▶ MEMS in the mainstream – market growth
- ▶ Globalization of MEMS
 - MEMS fabrication/foundries
 - Supply and demand for MEMS
- ▶ US market perspective
 - Advantages
 - Challenges
 - What's next?

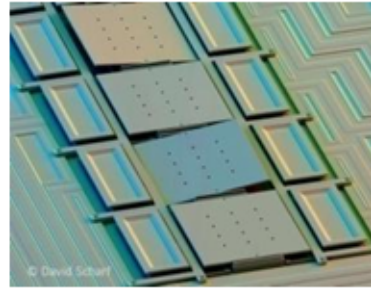
MEMS in the Machine



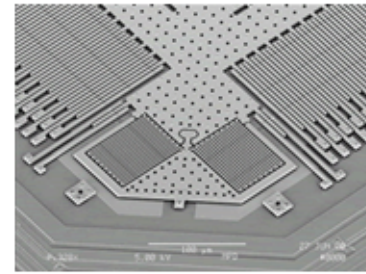
MEMS inside



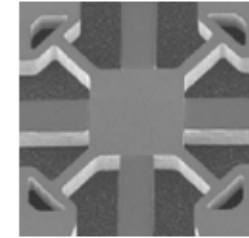
Pressure sensor



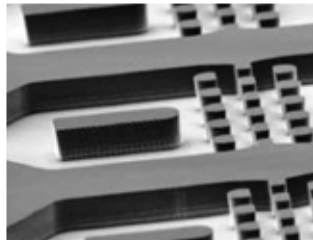
Micro-mirrors
Optical MEMS



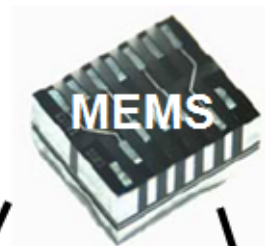
Inertial MEMS
Gyroscopes & accelerometers



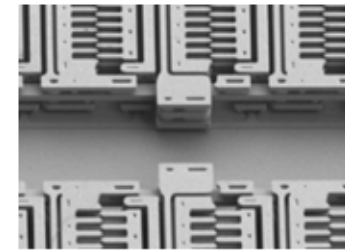
RF-Resonators



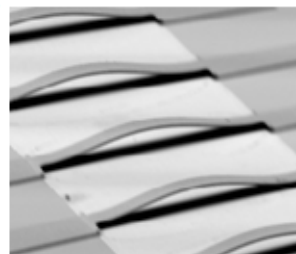
Ink-jet & Micro-fluidic
Print Heads



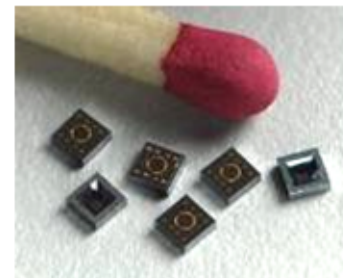
MEMS



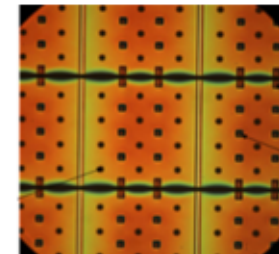
Micro-actuators



RF-MEMS
switches, Filters...

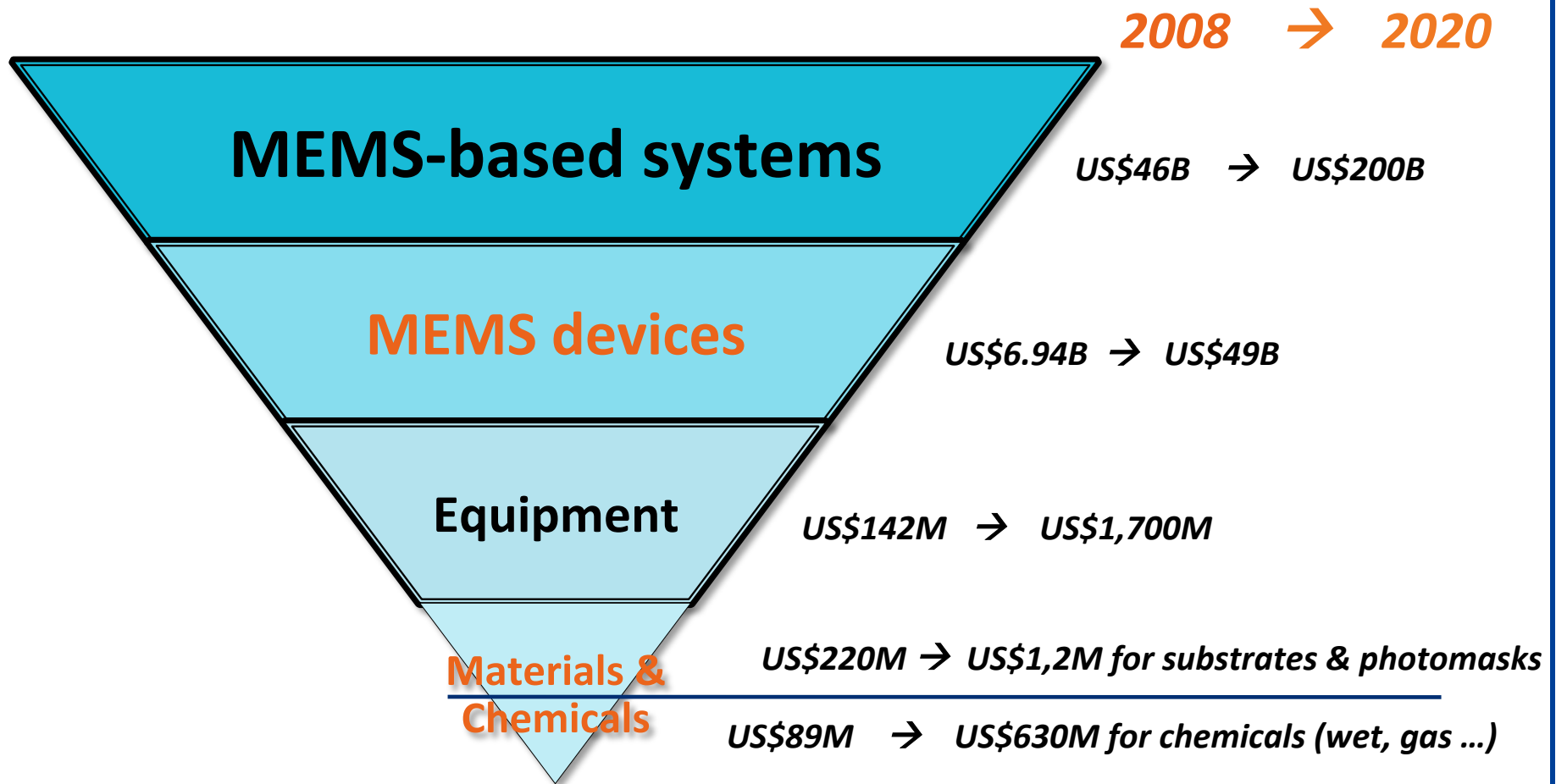


Si Microphones



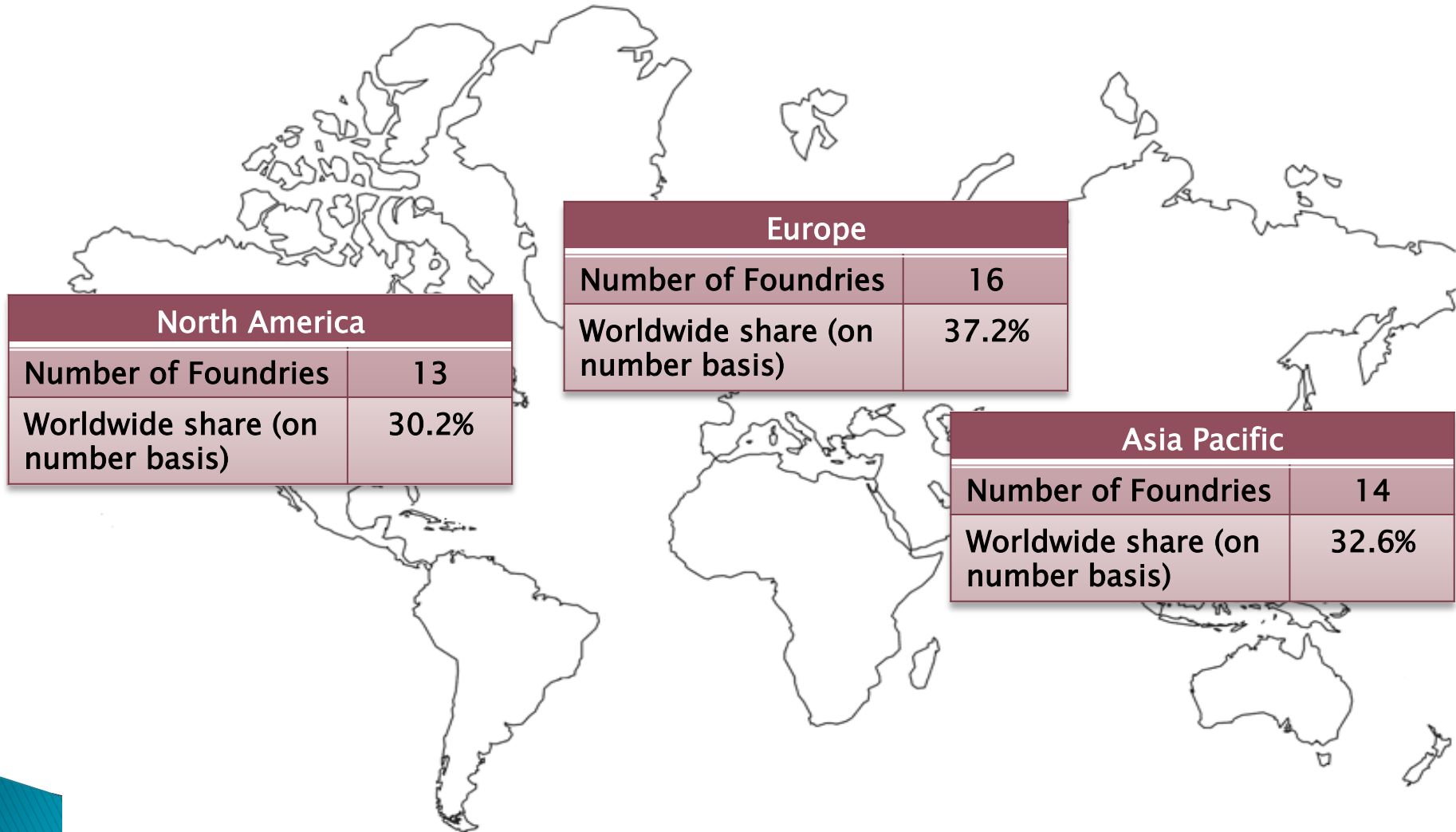
Micro-Displays

The MEMS Supply Chain Growth 2008–2020



Identification of Worldwide Foundries

Geographic breakdown of major foundries

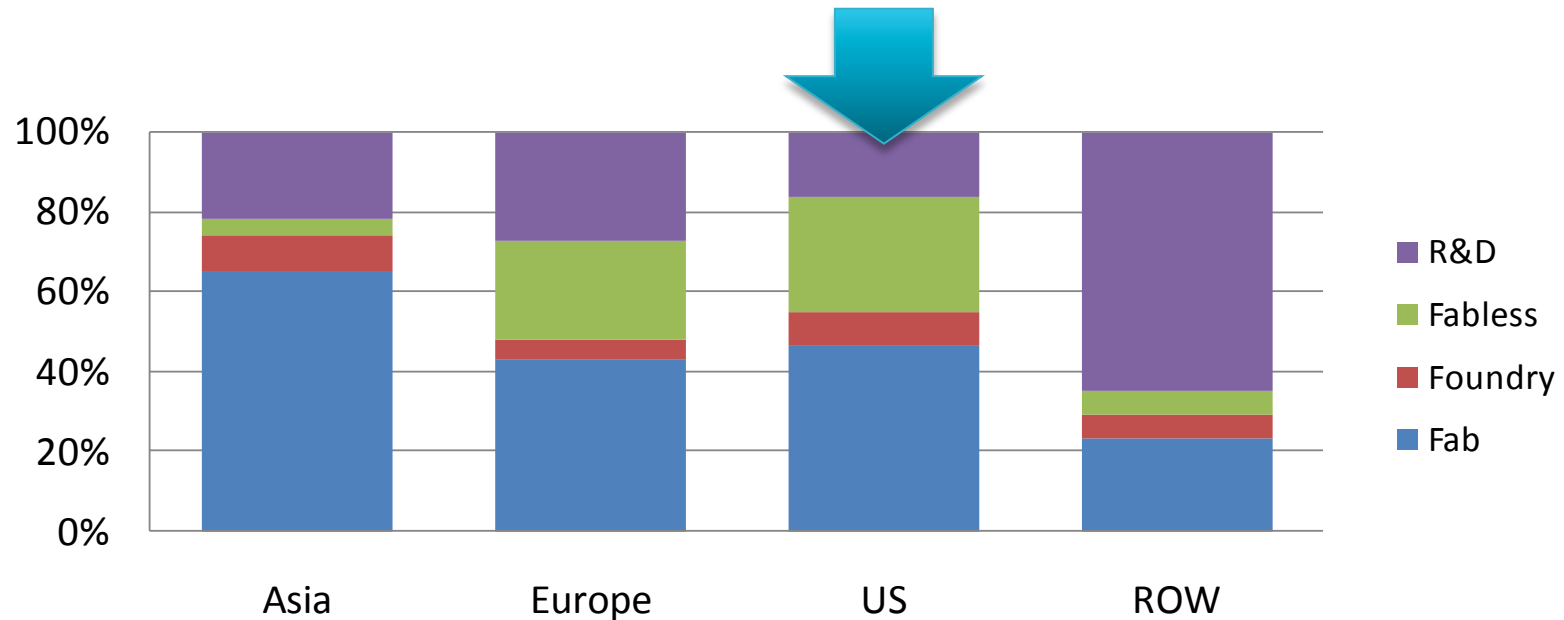


* Without R&D institutes

Breakdown of MEMS Business Model by region



US is #1 in Fabless MEMS Companies

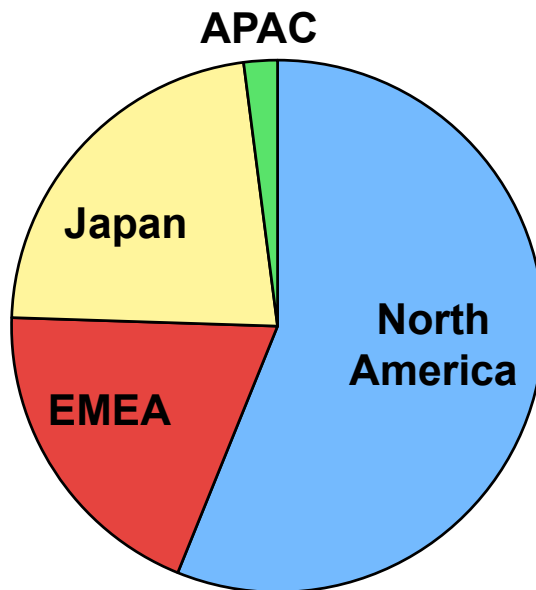


	Asia	Europe	US	ROW
Fab	65%	43%	47%	24%
Foundry	9%	5%	8%	6%
Fabless	4%	25%	29%	6%
R&D	22%	27%	16%	65%

North America Dominates Supply of MEMS



% of MEMS production by region of HQ



- ▶ North America accounts for 55% of the production of MEMS
- ▶ Largely influenced by “800 pounds Gorillas” HP and TI, the top 2 MEMS manufacturers for several years

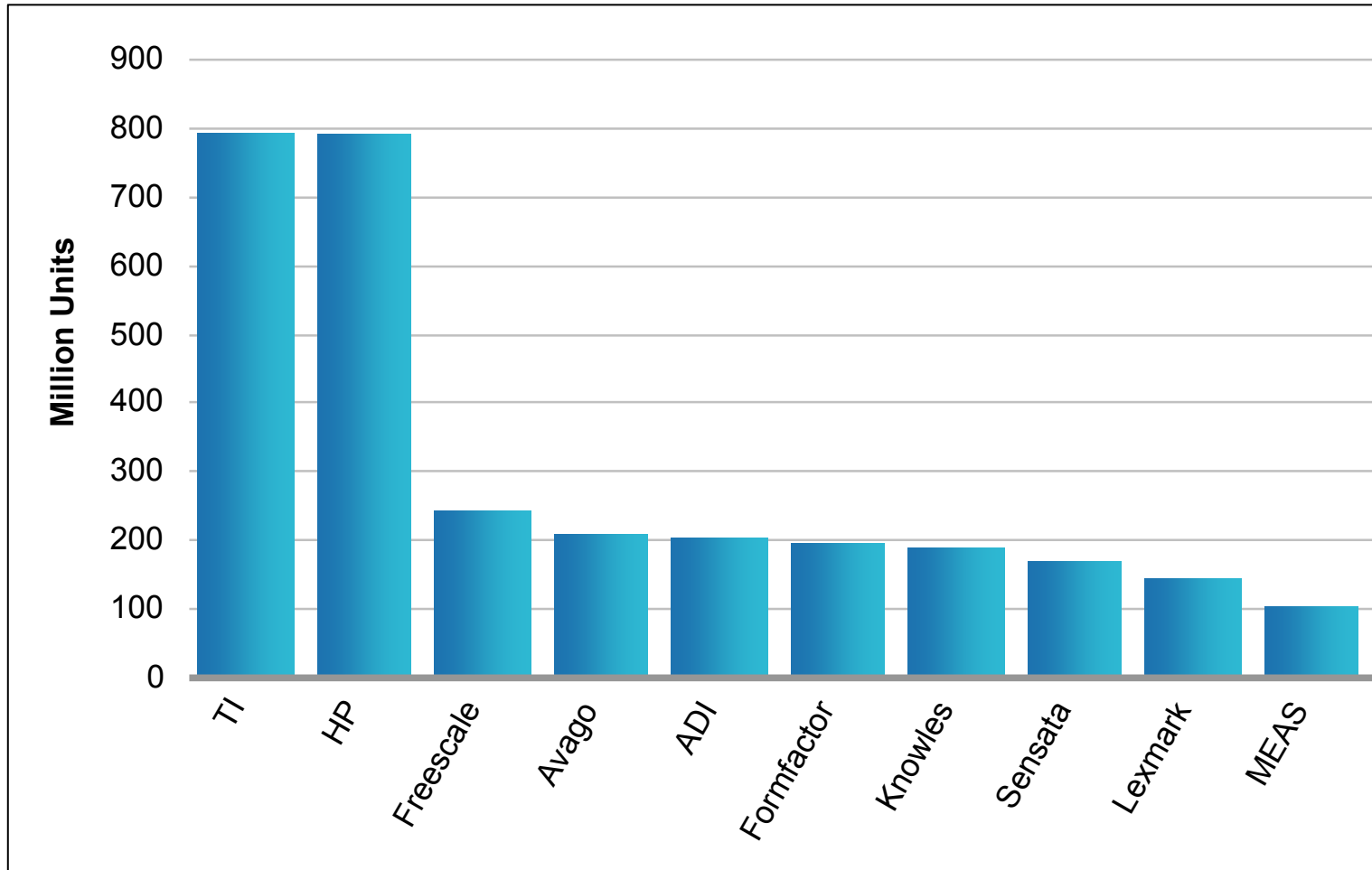
Source – IHS iSuppli Corporation H2 2010 MEMS market tracker



has
acquired

iSuppli™

10/18 MEMS Producers with over \$100M in 2010 in the US



MEMS revenue at top US IDM and Fabless* companies in 2010

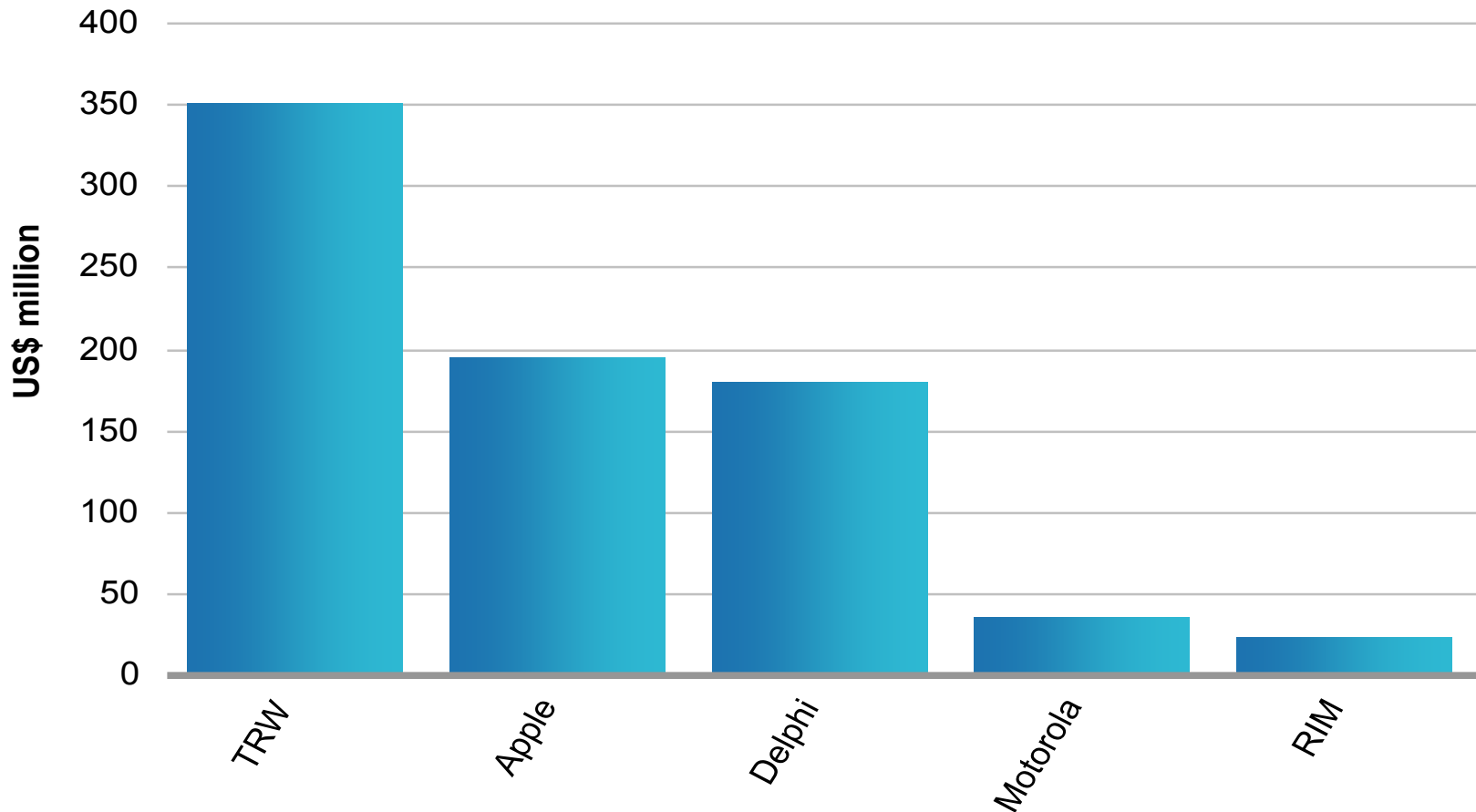
Source – IHS iSuppli Corporation Q1 2011 MEMS market tracker



has acquired

iSuppli

Top North American Buyers of MEMS



MEMS purchase by North American OEMs in 2010

Source – IHS iSuppli Corporation H2 2010 Automotive MEMS market tracker and H2 2010 Consumer and Mobile MEMS market tracker



has acquired

iSuppli™

USA: #1 Sandbox for MEMS Startups



- ▶ InvenSense (gyroscopes for consumer electronics), the most successful MEMS start-up today
- ▶ WiSpry: will (possibly) be the first company worldwide to ship MEMS RF switches/varactors for “holy grail” market cell phones in 2011
- ▶ The ONLY 4 MEMS oscillators start-ups in the US
 - SiTime, Discera, Silicon Clocks and SiLabs
- ▶ Microvision: only supplier of MEMS scanner projector displays commercially available today – but watch out for TI with DLP Pico Chipset
- ▶ Qualtre: innovative 3-axis gyroscope approach, possibly breakthrough in power consumption

USA: # 1 in *Innovative MEMS Design*



- ▶ The MEMS industry owes a big one to Apple!!!
 - Apple has created the market for accelerometers and gyroscopes in cell phones with iPhone(S)
 - Apple created the tablet market: a new opportunity for MEMS worth \$28M in 2010 and over \$200M in 2015!
- ▶ Qualcomm:
 - Leading wireless semiconductor worldwide (*source: iSuppli Semiconductor Competitive Landscape*)
 - Explores future applications that will make use of sensors in phones
- ▶ HP:
 - Big potential player – MEMS everywhere – utilizing inertial sensing tech repurposed for new markets – sensor networks (Shell collaboration)

USA: # 1 in *Driving MarketS for MEMS*



- ▶ Innovative use of MEMS by Google and Microsoft:
 - Even Texas Instrument getting into the game with its OMAP application processor – ready to handle 6 sensors and 6 digital microphones

- ▶ DARPA and DoD:
 - MEMS is still a leader in commercial as well as military applications – the first technology to be developed in both

- ▶ NHTSA:
 - MEMS is everywhere in your car thanks to US regulation (oftentimes following EU)

Challenges



- ▶ HUGE price pressures in Consumer Electronics – expect this to continue
 - To differentiate MEMS companies must add functionality
- ▶ Not really “one product one process” but still darned close
- ▶ MEMS testing protocols and the “s” word

Conclusions



- ▶ Innovation Matters: US still a leader in innovation!
- ▶ US MEMS companies will continue to benefit from global trends
- ▶ High-volume manufacturing is a key component to growth
- ▶ Don't just think about MEMS as hardware

Main Message – MEMS is in the Mainstream

- ▶ Mature stable industry with a robust infrastructure behind it

Contact MIG

www.memsindustrygroup.org

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Linked in

 **WORDPRESS** MEMSBlog

twitter

Thank you!



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