



Advanced Single-Wafer Wet Cleaning Tools for Leading Edge Integrated Circuit Fabs

May 2019



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Market Data. Information presented below under “ACM Investment Summary” contains estimates of ACM Research concerning ACM Research’s total addressable markets (“TAM”) that are based on industry publications, reports and customer-generated information. This information involves a number of assumptions and limitations, and you are cautioned not to rely on or give undue weight to this information. ACM Research has not independently verified the accuracy or completeness of the data contained in these publications, reports or filings. The industry in which ACM Research operates is subject to a high degree of uncertainty and risk due to variety of factors, including those described in ACM Research’s public filings with the Securities and Exchange Commission, as described above.

Note Regarding Presentation of Non-GAAP Financial Measures. Information presented below under “Q1 2019 Operating Highlights” and “Q1 2019 Financial Results” includes certain “non-GAAP financial measures” as defined in Regulation G under the Securities Exchange Act of 1934, including non-GAAP gross profit, non-GAAP operating profit and non-GAAP operating margin. These supplemental measures exclude the impact of stock-based compensation, which ACM Research does not believe is indicative of its core operating results. A reconciliation of each non-GAAP financial measure to the most directly comparable GAAP financial measure is included in ACM Research’s first-quarter earnings release dated May 8, 2019, which (a) has been filed with the Securities and Exchange Commission and can be viewed at https://www.sec.gov/Archives/edgar/data/1680062/000165495419005406/acmr_ex991.htm and (b) has been posted at, and can be downloaded from, the “Investors” content area at ACM Research’s website, <http://ir.acmrcsh.com/news-releases/news-release-details/acm-research-reports-first-quarter-2019-results>.

Q1 2019 Operating Highlights

- **Business Momentum Continued Despite Near-term Industry Challenges**
- **Solid Q1 Results**
 - \$20.5 million revenue, up 110% from Q1 2018
 - 43.1% GAAP gross margin and 11.0% GAAP operating margin
 - 43.2% non-GAAP gross margin and 14.6% non-GAAP operating margin
 - \$27.4 million cash balance at March 31, 2019
- **Total shipments of \$14 million in Q1 2019**
 - Increase of 40% from \$10 million in Q1 2018
- **Key operational progress:**
 - Delivered first Ultra-C Tahoe evaluation tool
 - Introduced two electro-plating products – Ultra ECP AP and Ultra ECP MAP
 - Production ramp at second factory on track

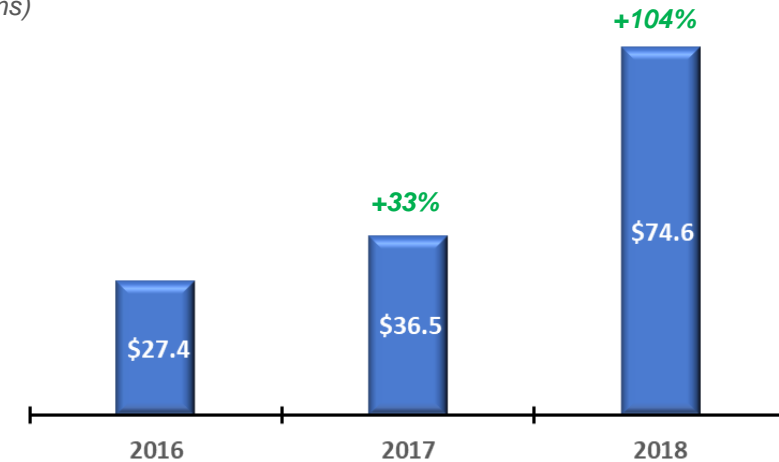
ACM Research Highlights

Company Background

- **Best-in-class** semiconductor wafer cleaning tools for higher yields and better efficiency at advanced fabs
- **Patented technology** delivers highly effective single-wafer wet cleaning for flat and simple structures (SAPS), and damage-free cleaning for advanced 3D patterned wafers (TEBO)
- Products address an estimated **50%+ of the \$3.1B** Single-Wafer Wet Cleaning TAM, with future expansion from new products
- HQ in Fremont, CA with operations in Shanghai, China and more than 250 employees. More than **220 patents** issued in the U.S., PRC, Japan, Korea, Singapore and Taiwan (as of 3/31/2019)
- **Referenceable customer base and in-region support** position ACM to scale business with China's investment cycle
- Capacity floor space **more than doubled** to 86,000 square feet with addition of second factory in 2018

Revenue

(\$ in millions)



World Class Customer Base

Single-wafer wet cleaning tools



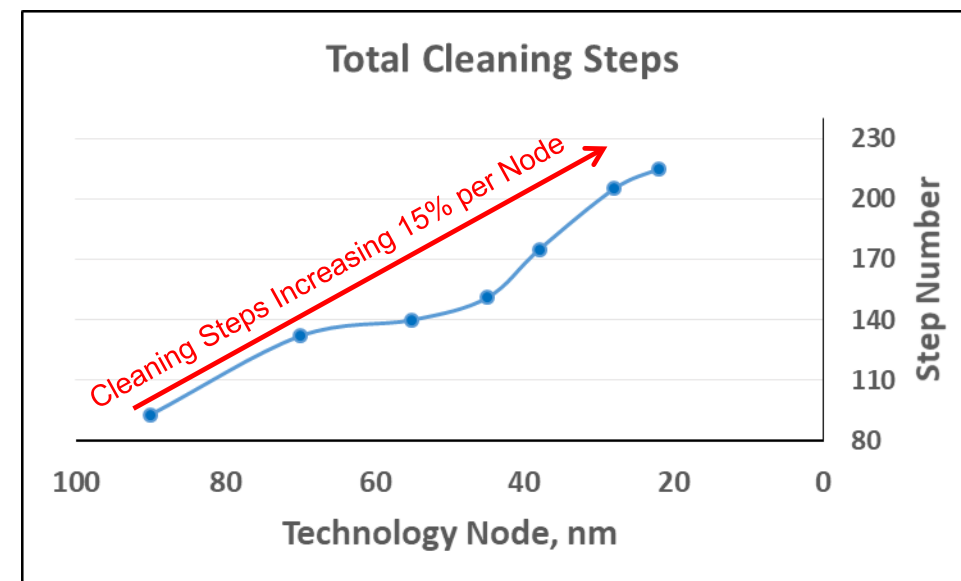
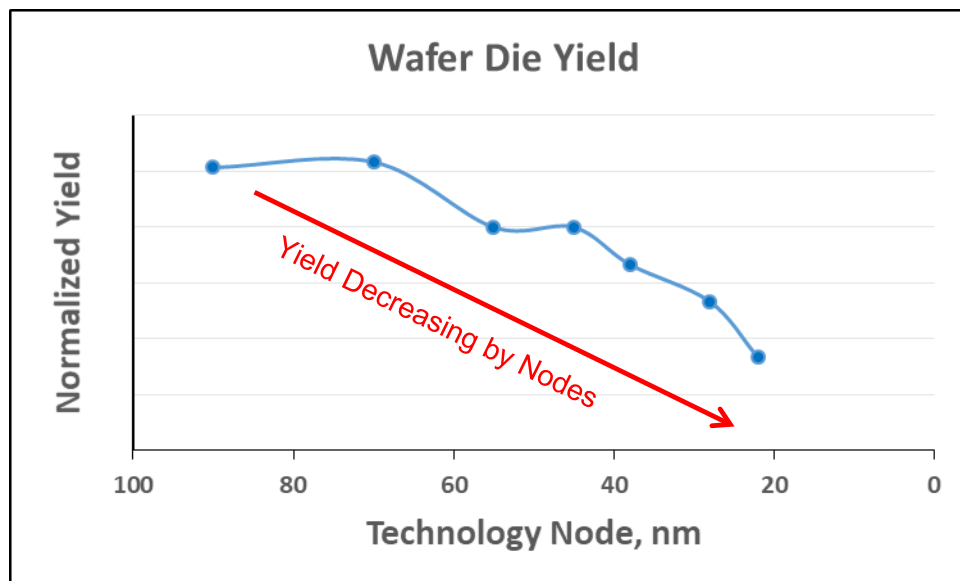
Advanced Wafer-Level Packaging & Manufacturing Tools



Deca Technologies



Killer Defects Impact Yields at 50nm and Below*



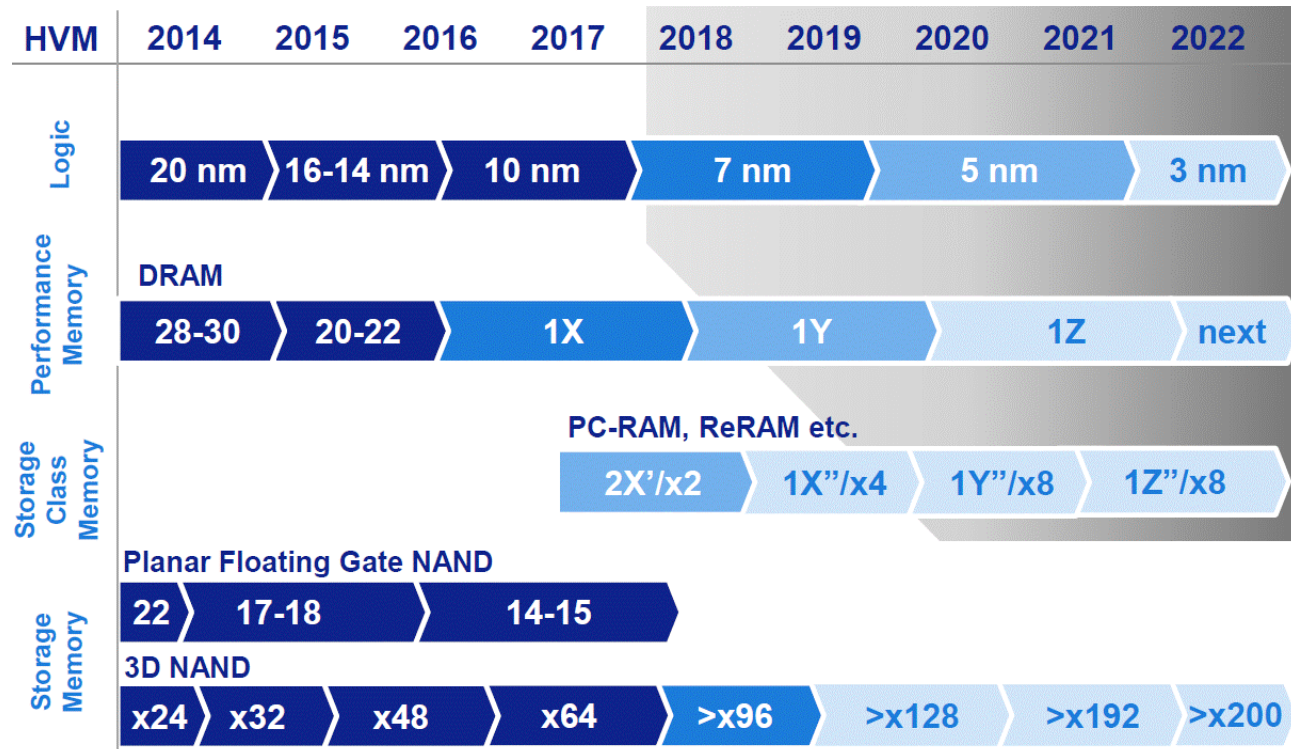
We estimate that 1% yield loss can lead to annual profit decrease of \$30M to \$50M

- Based on DRAM fab with 100K wafer starts per month
- Yield can be improved with breakthrough capabilities and more cleaning steps

* Source: Customer Data, ACM Estimates

Semiconductor Roadmap Demands Lithography & Cleaning

IC Roadmap: Transistor Shrink, FinFETs & Larger Wafers*



Key Process Equipment Groups

- Implantation
- Deposition
- Microlithography
- Etch
- Clean
- CMP
- Metrology

Most Critical for 22nm and Smaller Node Devices

ACM offers wafer cleaning equipment designed to address one of the two key fabrication challenges

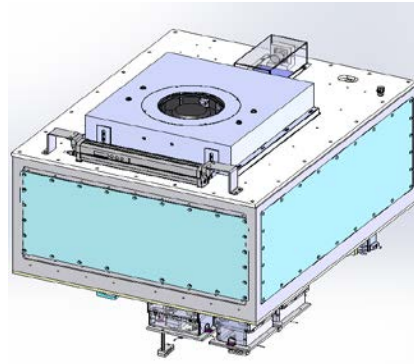
* Source: ASML 2018 Presentation

SAPS: Uniform Megasonic Cleaning Overview

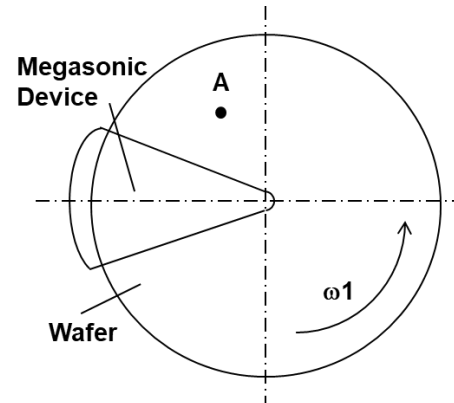
SAPS Machine (8-Chambers)



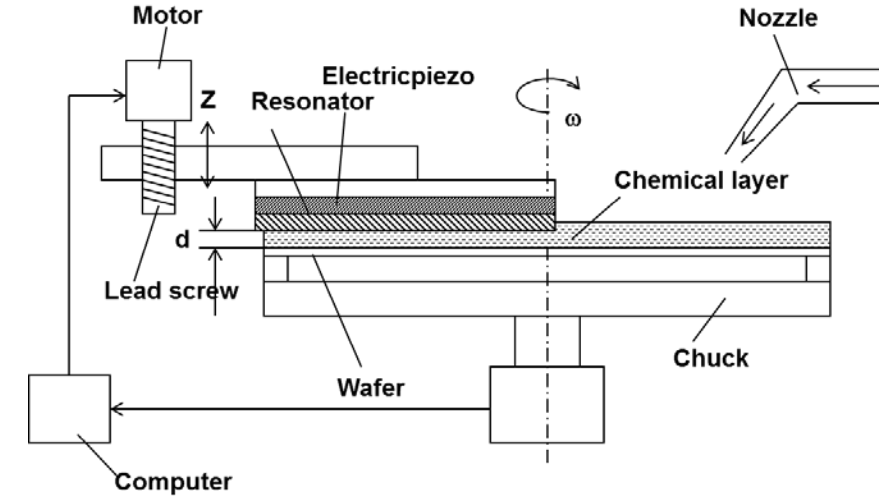
Megasonic Chamber Detail



Top-View – Uniform Power

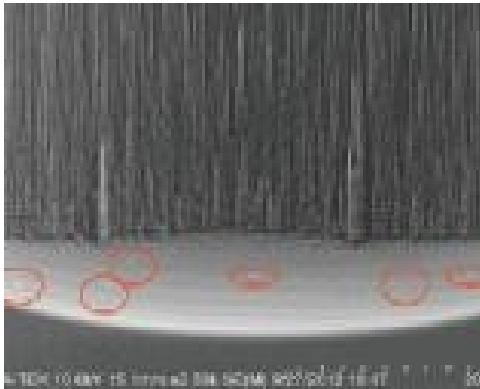
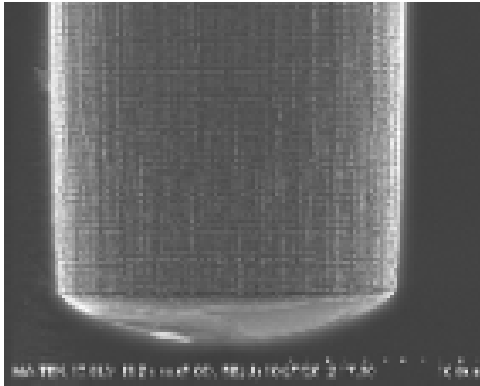


Side-View – “Mind the Gap (d)”

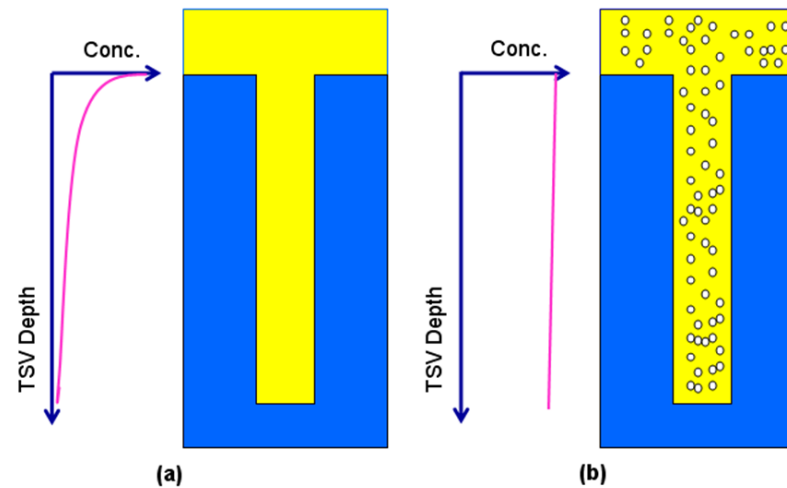


SAPS Particle Removal: Before & After

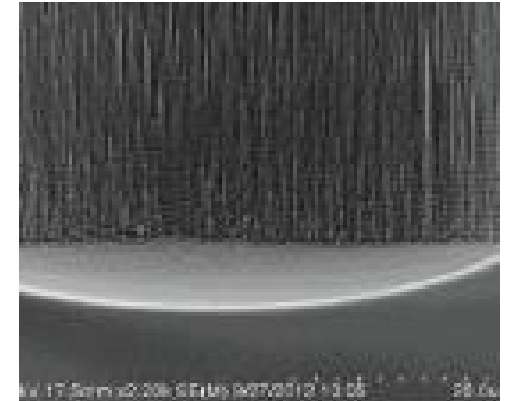
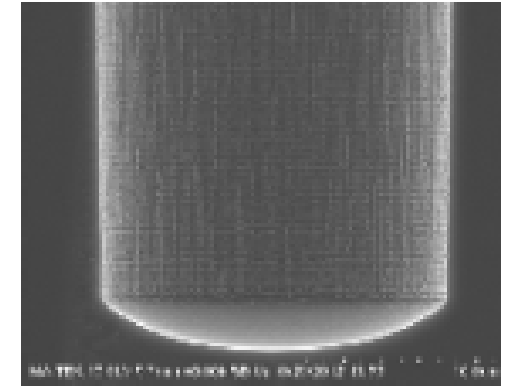
Before: Defects After Etching



SAPS Uniform Megasonic Clean



After: Killer Defects Removed



Source: ACM Clean Room Tests

ACM Investment Summary

Advanced Single-Wafer Wet Cleaning Tools for Leading Edge IC Fabs



1

Growing Share of ~\$3.1B+ Single-Wafer Wet Cleaning TAM

2

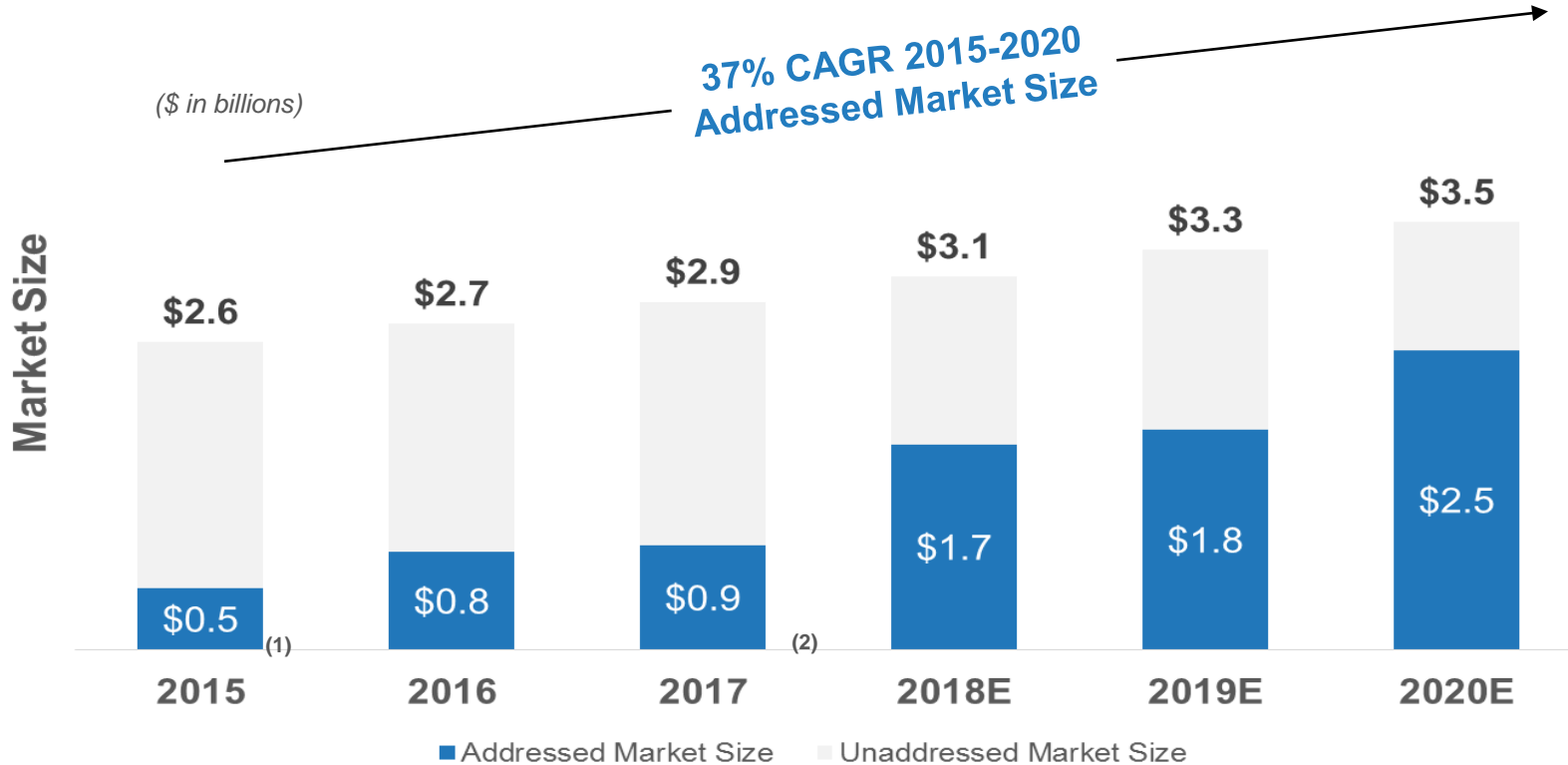
China Operations Located Near Major New Fabs

3

Referenceable DRAM, NAND, Foundry and Logic Customers

4

Capacity Expanded with Second Factory



Growth Drivers:

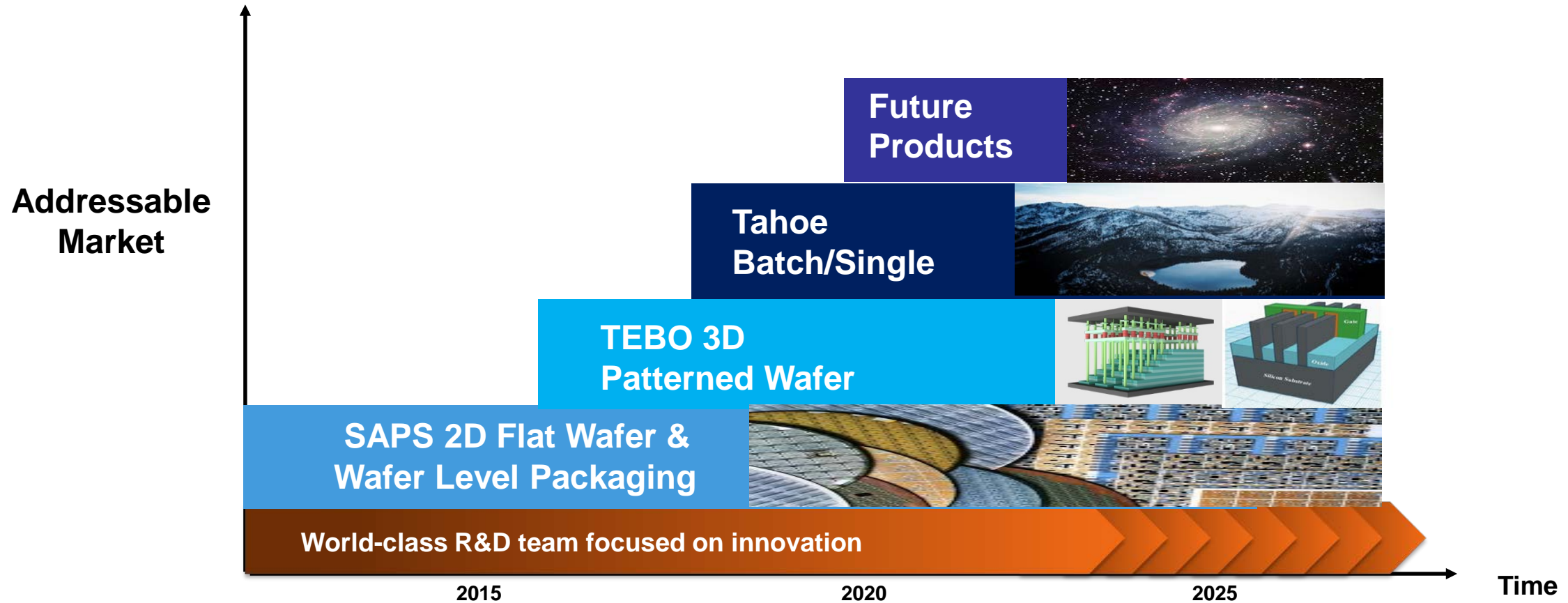
1. New Products
2. More Cleaning Steps at Higher Nodes
3. Customers Scaling Production
4. New Customers
5. Expanding Production

ACMR Opportunity Improves With Move to Advanced Process Nodes

(1) 2015 – 2016 TAM per Transparency Market Research Pvt. Ltd., Report – Global Semiconductor Wafer Cleaning Equipment Market, December 2016

(2) 2017 – 2020E TAM per Technavio, Report – Global Semiconductor Wafer Cleaning Systems Market

Our Product Expansion Vision



ACM estimates that SAPS, TEBO, and Tahoe address more than 50% of the single-wafer wet cleaning market

ACM Research Single-Wafer Wet Cleaning Products

SAPS



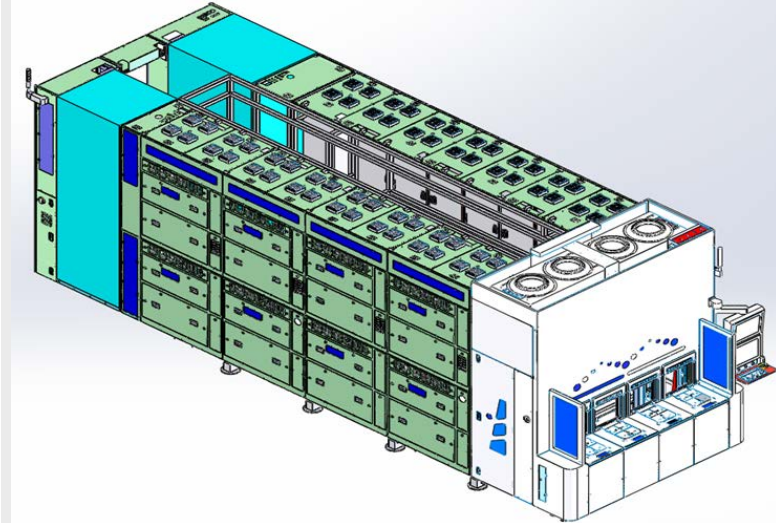
***Megasonic Cleaning for
2D Structures***

TEBO



***Disruptive Solution for
3D Patterned Wafer Surface***

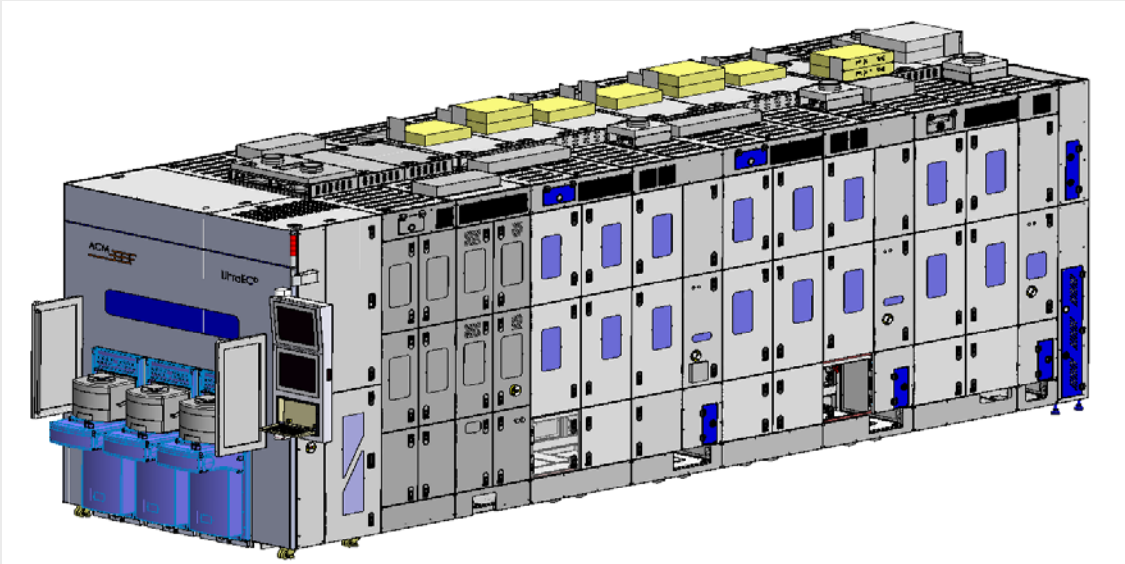
Ultra – C Tahoe



***Hybrid Wafer Cleaning With Significant
Cost & Environmental Benefits***

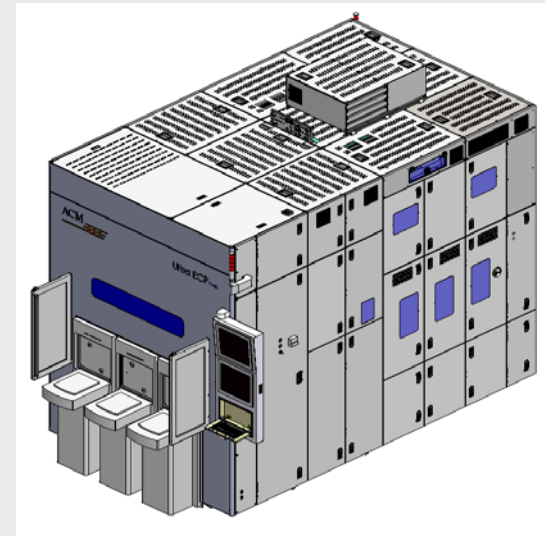
ACM Research Semiconductor Electro-plating Products

Ultra ECP AP



- ***Advanced Wafer Level Packaging***
- ***Back-end Assembly Tool***

Ultra ECP MAP

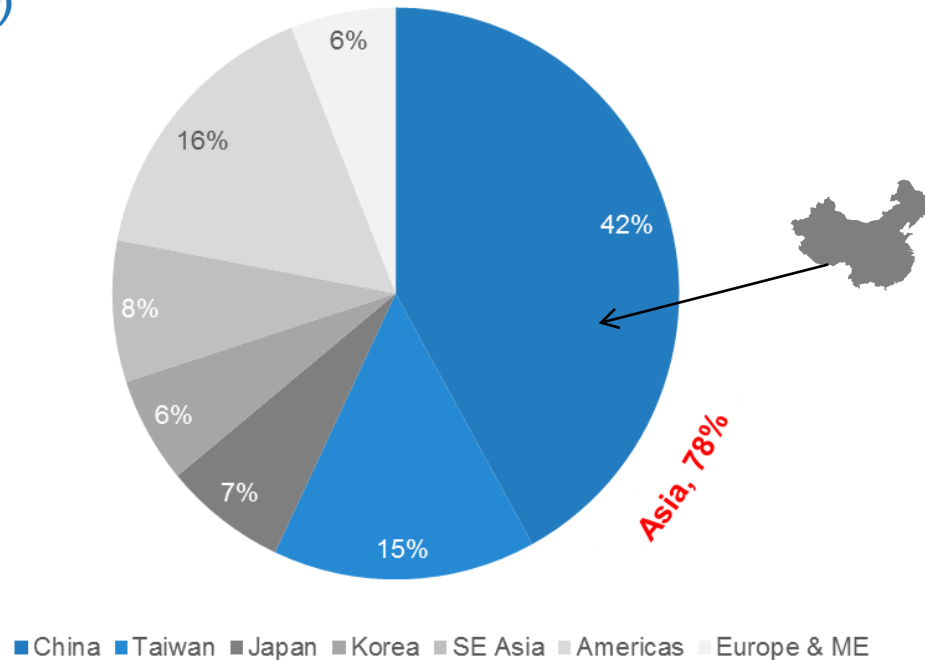


- ***Multi Anode Partial Plating***
- ***Front-end wafer fabrication processes***

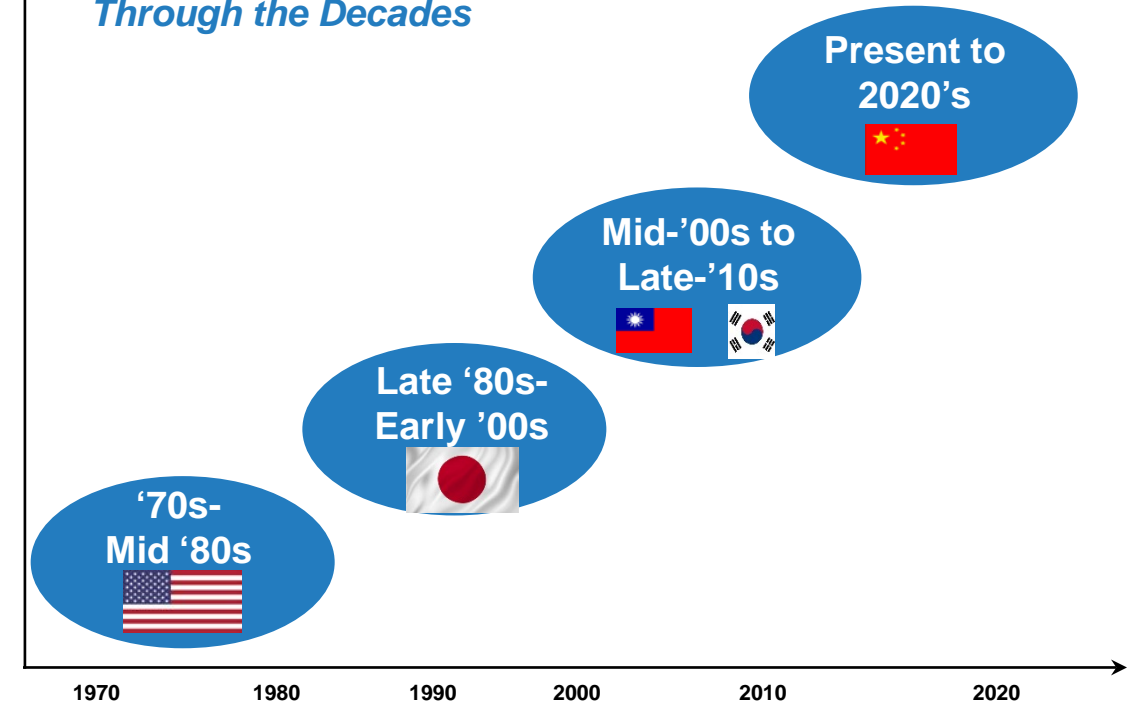
ACM's ECP tools deliver significant benefits, including greater performance, increased flexibility, and improved cycle times

Semiconductor Industry Development

New Facilities and Production Lines Starting Operation (2017-2020)

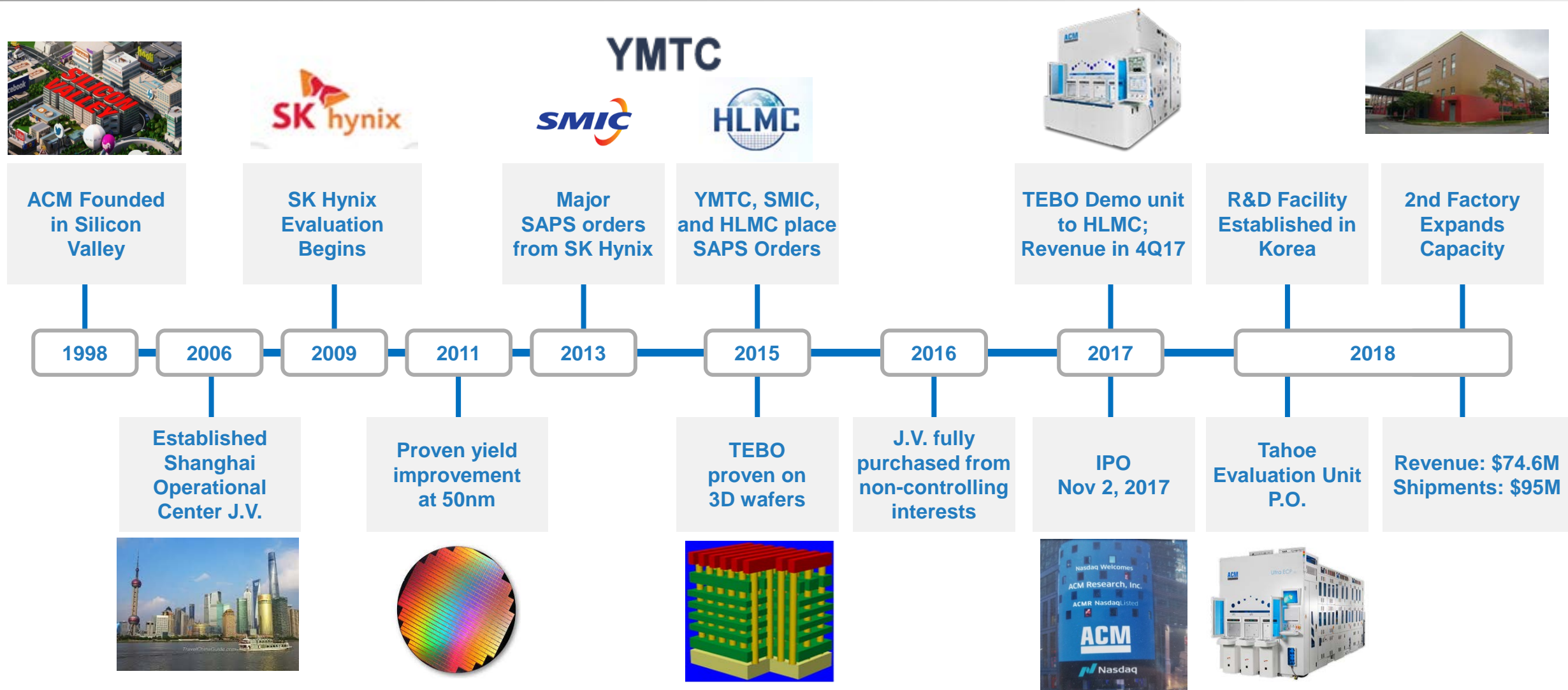


Industry Center Shifts Through the Decades



Strong presence in Asia and close proximity to Chinese customers add to key competitive advantages.

Source: World Fab Forecast Report (November 2016, SEMI)

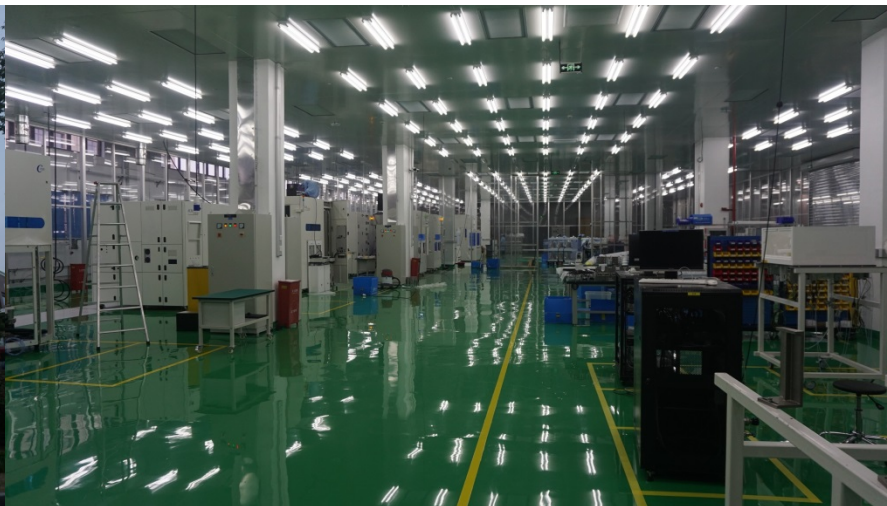


New Factory Ramps Production

- New factory added 50,000 square feet of production capacity to 36,000 square feet at existing facility
- Production initiated at new factory in Q3 2018, expanded in Q4 2018 and ramping over the course of 2019



10-mile drive from
ACM Research's Shanghai headquarters



First phase of capital expenditures
completed in 2018



Majority of Production Mix Q1 2019

ACM Management and Board of Directors

ACM Management Team Decades of Industry Experience



David Wang, CEO

*Exp: Questar Tech
Ph.D. Osaka University;
BS Tsinghua University*



Lisa Feng, CAO

*Exp: Coherent, Amlogic
Masters: Accounting*



Mark McKechnie, VP Finance

*Exp: Intel, Motorola, Evercore
MBA Kellogg, BSEE Purdue*



Jian Wang, CTO

*Exp: 20+
MSc*



So Cheav, VP Mfg

*Exp: 25+
BSc*



Fuping Chen, VP Sales

*Exp: SK Hynix
MSc*

Board of Directors

Average of 25+ Years Experience in Semiconductor Industry and High Tech Business



Dr. David H. Wang

ACM CEO & Founder



Dr. Haiping Dun

*Engineering Director at Intel;
CEO at Champion*



Prof. Chenming Hu

*Inventor of FinFET;
Professor at UC Berkeley*



Tracy Liu

*Managing Partner of
H&M Int'l Accounting*



Yinan Xiang

*General Manger of
SSTVC*



Zhengfan Yang

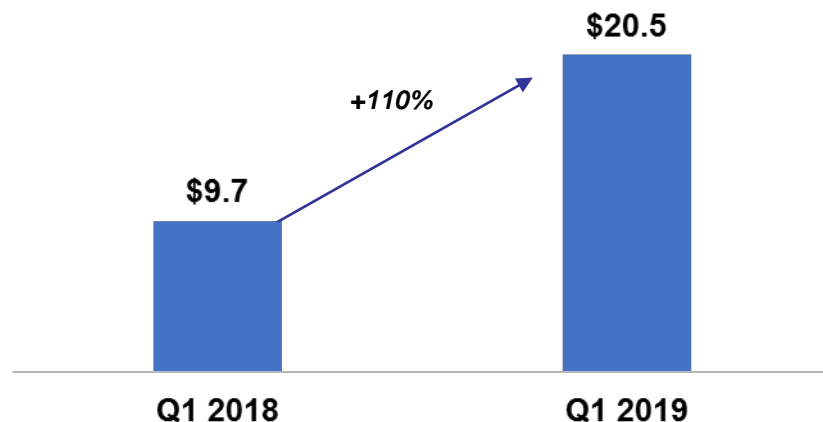
*Director of
Sino IC*

Backup

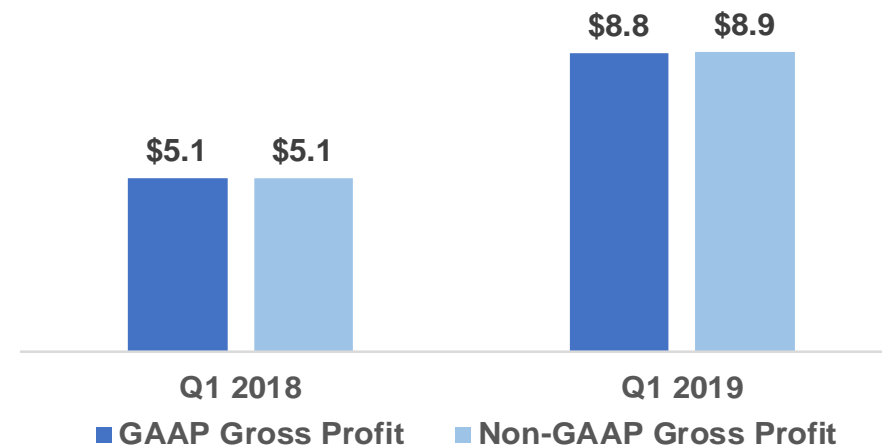
Q1'19 Financial Results

\$ Millions

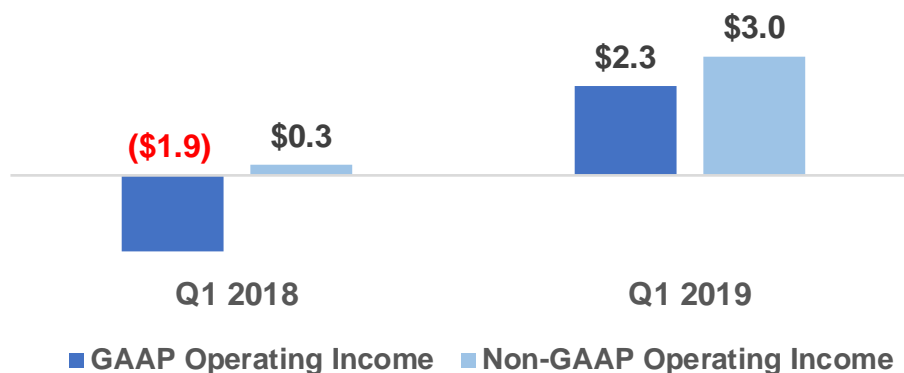
Revenue



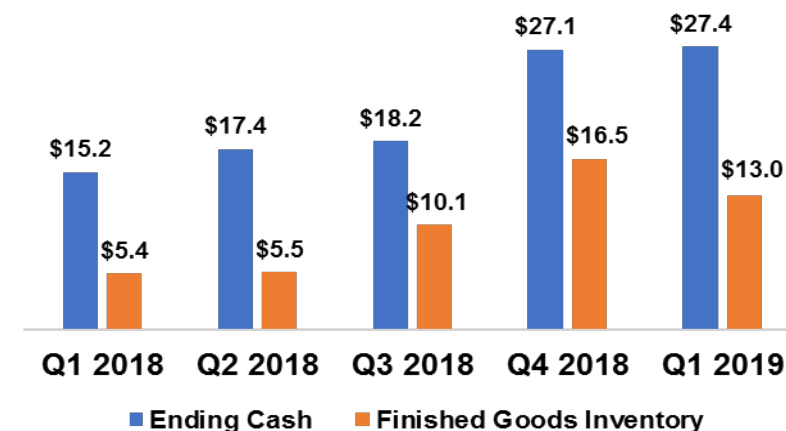
Gross Profit



Operating Profit



Balance Sheet Data



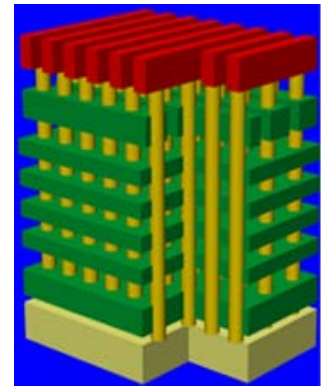
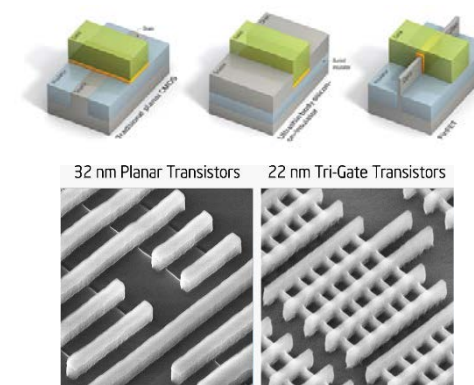
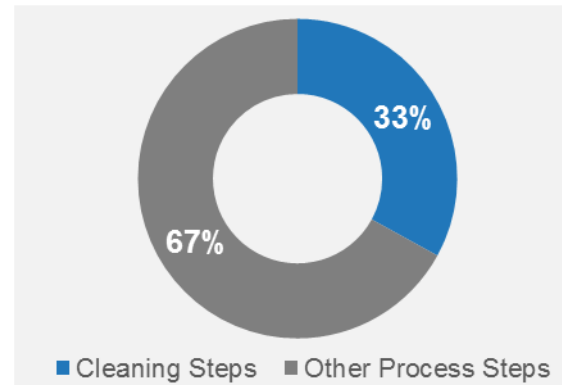
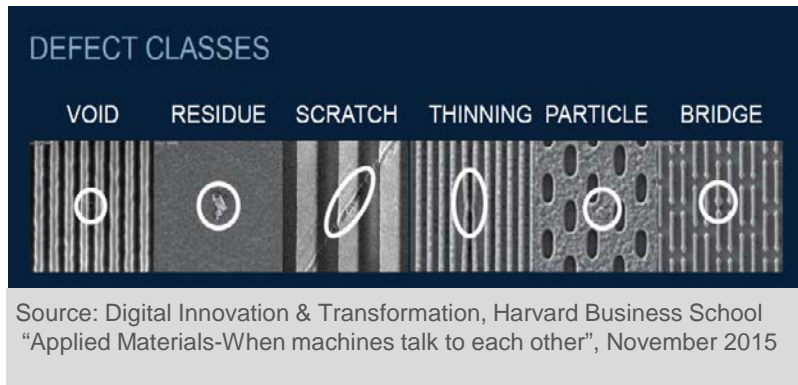
Importance of Wafer Cleaning in Semiconductor Manufacturing

Importance of Wafer Cleaning

- Wafer cleaning is implemented to remove defects and particles in order to achieve good die yield
- More than 1/3 of process steps are cleaning steps
- 20 nm node DRAM: as many as 200 cleaning steps

Challenges for Advanced Technology Nodes

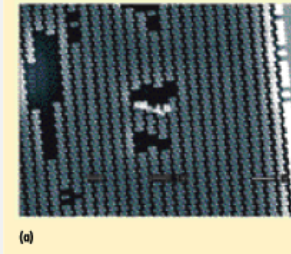
- New transistor architectures, ever smaller & more fragile features, and 3D structures lead to inadequacy or failure of conventional cleaning
- “Killer Defect” sizes shrink
- Poor PRE (Particle Removal Efficiency)
- Damage to fine device features



ACM's proprietary SAPS & TEBO solutions are designed to address these issues, which represent an estimated 30% of the Single-Wafer Wet Cleaning TAM

TEBO: Proprietary Technology Reduces or Eliminates Feature Damage

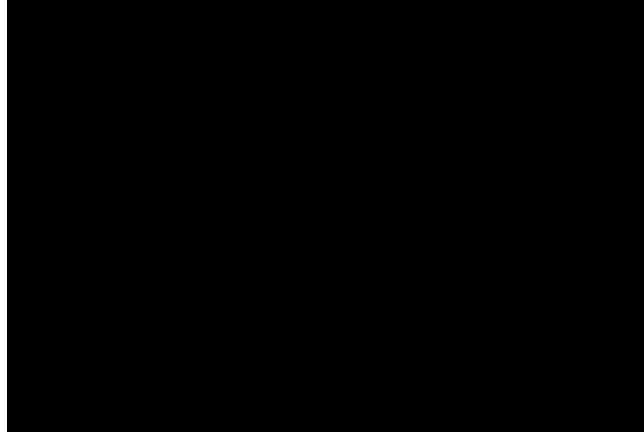
As device features become *smaller and more fragile* with high aspect ratios (feature structure depth to width ratio), conventional cleaning processes can lead to damages and loss of yield



SEM images of damages at 50-nm DRAM storage capacitors following a dSC-1 clean with megasonics in a batch immersion tool using high power densities

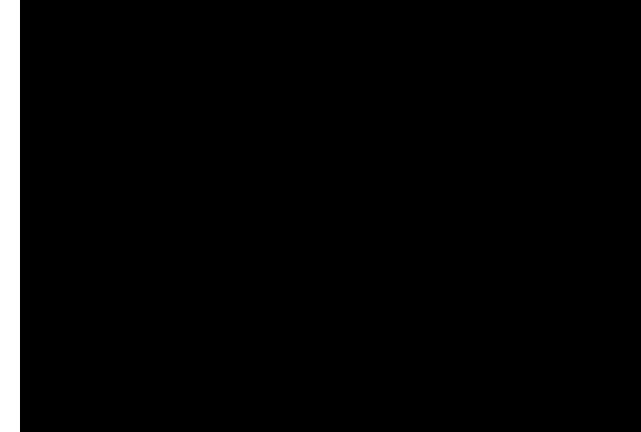
Source: Micromagazine.fabtech, by John Rosato, et al., *SCP Global Technology*

Conventional Megasonic Cleaning



Transit cavitation results in violent micro-jet causing damage to wafer structures

TEBO Megasonic Cleaning

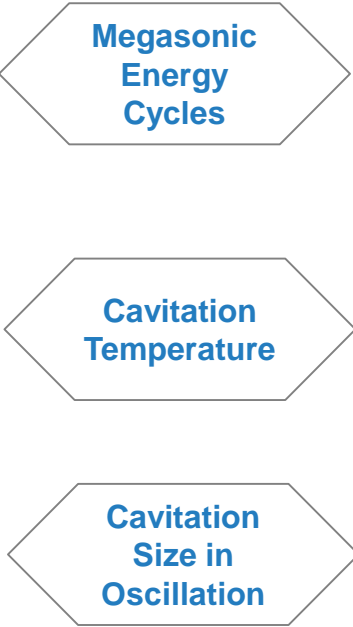
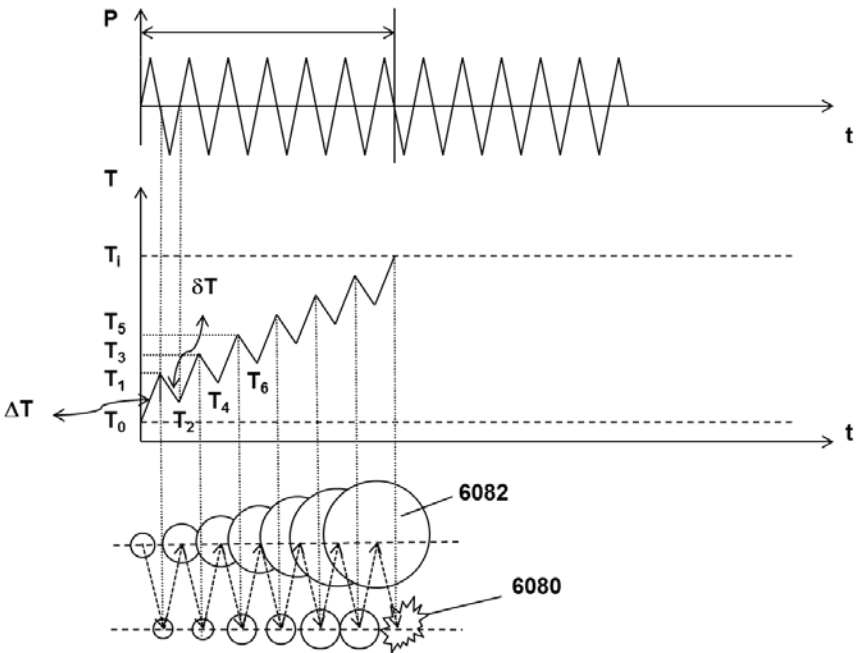


Stable cavitation

TEBO Technology: Works by Controlling Transit Cavitation Formation

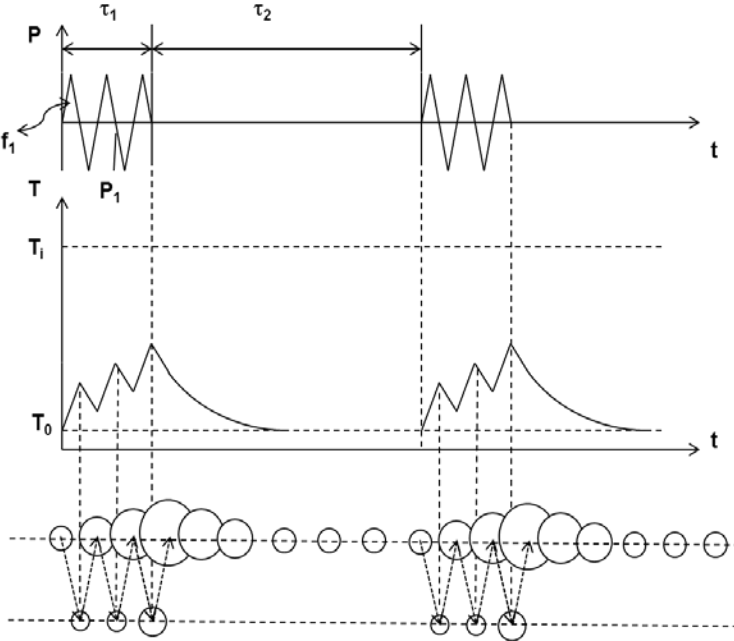
Conventional Megasonic Cleaning

Transit Cavitation Implosion
Damages Wafer Structure

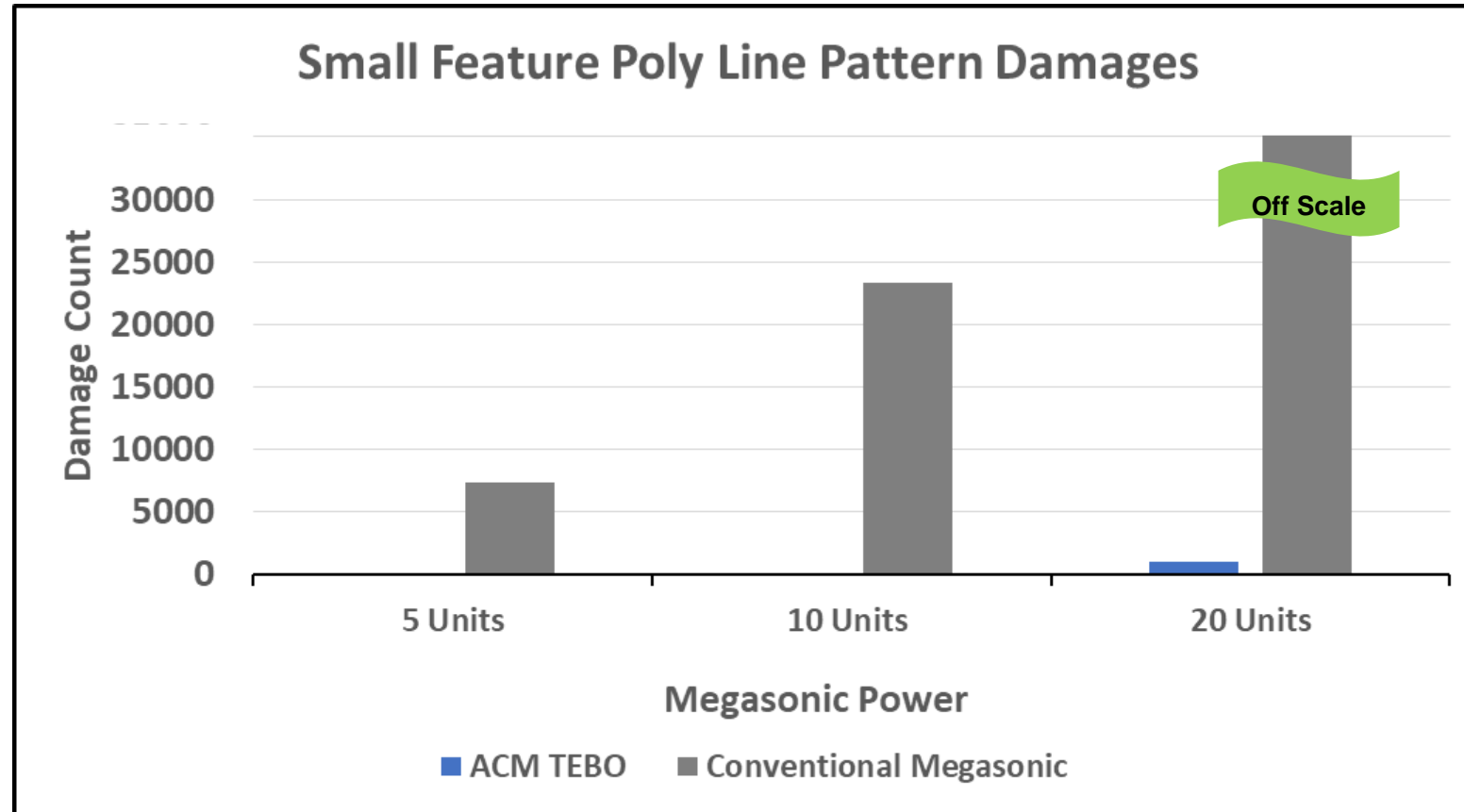


TEBO Megasonic Cleaning

Stable Cavitation, Effective Cleaning, Low/No Damage



ACM TEBO vs. Conventional Megasonic on Pattern Damage Performance



- Adequate power level is needed to ensure effective cleaning action on the wafers
- However conventional mega-sonic clean at such power causes severe pattern damages
- TEBO can operate at such power with effective clean and no/low damages









Q1'19 Financial Highlights

	Three Months March 31,			
	GAAP		Non-GAAP(1)	
	2019	2018	2019	2018
	<i>(dollars in thousands)</i>			
Revenue	\$ 20,479	\$ 9,743	\$ 20,479	\$ 9,743
Gross margin(2)	43.1%	52.6%	43.2%	52.7%
Income (loss) from operations(2)	\$ 2,251	\$ (1,904)	\$ 2,995	\$ 271
Net income (loss) attributable to ACM Research, Inc.(2)	\$ 1,857	\$ (2,780)	\$ 2,601	\$ (605)
Basic EPS	\$ 0.12	\$ (0.18)	\$ 0.16	\$ (0.04)
Diluted EPS	\$ 0.10	\$ (0.18)	\$ 0.14	\$ (0.04)
Shares included in the basic EPS	16,045	15,383	16,045	15,383
Shares included in the diluted EPS	18,225	15,383	18,225	15,383

(1) Reconciliations to U.S. generally accepted accounting principles ("GAAP") financial measures from non-GAAP financial measures are presented below under "Reconciliation of GAAP to Non-GAAP Financial Measures."

(2) Non-GAAP financial measures exclude stock-based compensation.

Appendix – Non-GAAP to GAAP Reconciliations

	Three Months Ended March 31,					
	2019			2018		
	Actual (GAAP)	SBC	Adjusted (Non-GAAP)	Actual (GAAP)	SBC	Adjusted (Non-GAAP)
	<i>(in thousands)</i>					
Revenue	\$20,479	\$ -	\$ 20,479	\$9,743	\$ -	\$ 9,743
Cost of revenue	(11,653)	(30)	(11,623)	(4,621)	(8)	(4,613)
Gross profit	8,826	(30)	8,856	5,122	(8)	5,130
Operating expenses:						
Sales and marketing	(1,869) 	(34)	(1,835)	(1,855) 	(34)	(1,821)
Research and development	(2,765) 	(86)	(2,679)	(1,541) 	(27)	(1,514)
General and administrative	(1,941) 	(594)	(1,347)	(3,630) 	(2,106)	(1,524)
Income (Loss) from operations	\$ 2,251	\$ (744) 	\$ 2,995	\$ (1,904)	\$ (2,175) 	\$ 271
Net income (loss)	\$ 1,857	\$ (744)	\$ 2,601	\$ (2,780)	\$ (2,175)	\$ (605)