



# *Advanced Wet-Cleaning Tools for Leading Edge IC Fabs*

**December 2019**



# Disclaimer

**Forward-Looking Statements.** Information presented below under “ACM is Growing at a Rapid Pace” (including note 4 to “2018-2019E Growth”) and “Strong and Consistent Revenue Growth...” with respect to revenue to be generated in 2019 and under “Innovation and Product Introductions Expanding Addressable Market” with respect to ACM Research’s projected addressed market constitutes forward-looking statements for purposes of the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. Actual results may vary significantly from ACM Research’s expectations based on a number of risks and uncertainties, including but not limited to the following: anticipated customer orders or identified market opportunities may not grow or develop as anticipated; customer orders already received may be postponed or canceled; suppliers may not be able to meet ACM Research’s demands on a timely basis; volatile global economic, market, industry and other conditions could result in sharply lower demand for products containing semiconductors and for ACM Research’s products and in disruption of capital and credit markets; ACM Research’s failure to successfully manage its operations; and trade regulations, currency fluctuations, political instability and war may materially adversely affect ACM Research due to its substantial non-U.S. customer and supplier base and its substantial non-U.S. manufacturing operations. ACM Research cannot guarantee any future results, levels of activity, performance or achievements. The industry in which ACM Research operates is subject to a high degree of uncertainty and risk due to variety of factors. For a more complete discussion of these factors and other risks, please see the information disclosed under “Risk Factors” and elsewhere in ACM Research’s public filings with the Securities and Exchange Commission, including its Annual Report on Form 10-K for the fiscal year ended December 31, 2018 and each subsequently filed Quarterly Report on Form 10-Q. ACM Research expressly disclaims any obligation to update forward-looking statements after the date of this presentation.

**Market Data.** Information presented below under “Who is ACM Research?”, “ACM is Growing at a Rapid Pace,” “Well-Positioned to Participate in Asia Fab Investments” and “Investment Highlights” contains estimates, including forecasts, of Gartner, Inc. (“Gartner”) and Semiconductor Equipment and Materials International (“SEMI”), including concerning ACM Research’s addressable markets, including its total addressable market (“TAM”). The Gartner report in which the information attributed to Gartner appears represents research opinions or viewpoints that are published in a report, as part of a syndicated subscription service, by Gartner and that are not representations of fact. The information attributed to SEMI represents research opinions or viewpoints that were published, as part of a press release, by SEMI and are not representations of fact. Each of the Gartner report and the SEMI release speaks as of its original publication date (and not as of the date of this presentation), and the opinions expressed therein the Gartner report are subject to change without notice. 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 this information. 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.

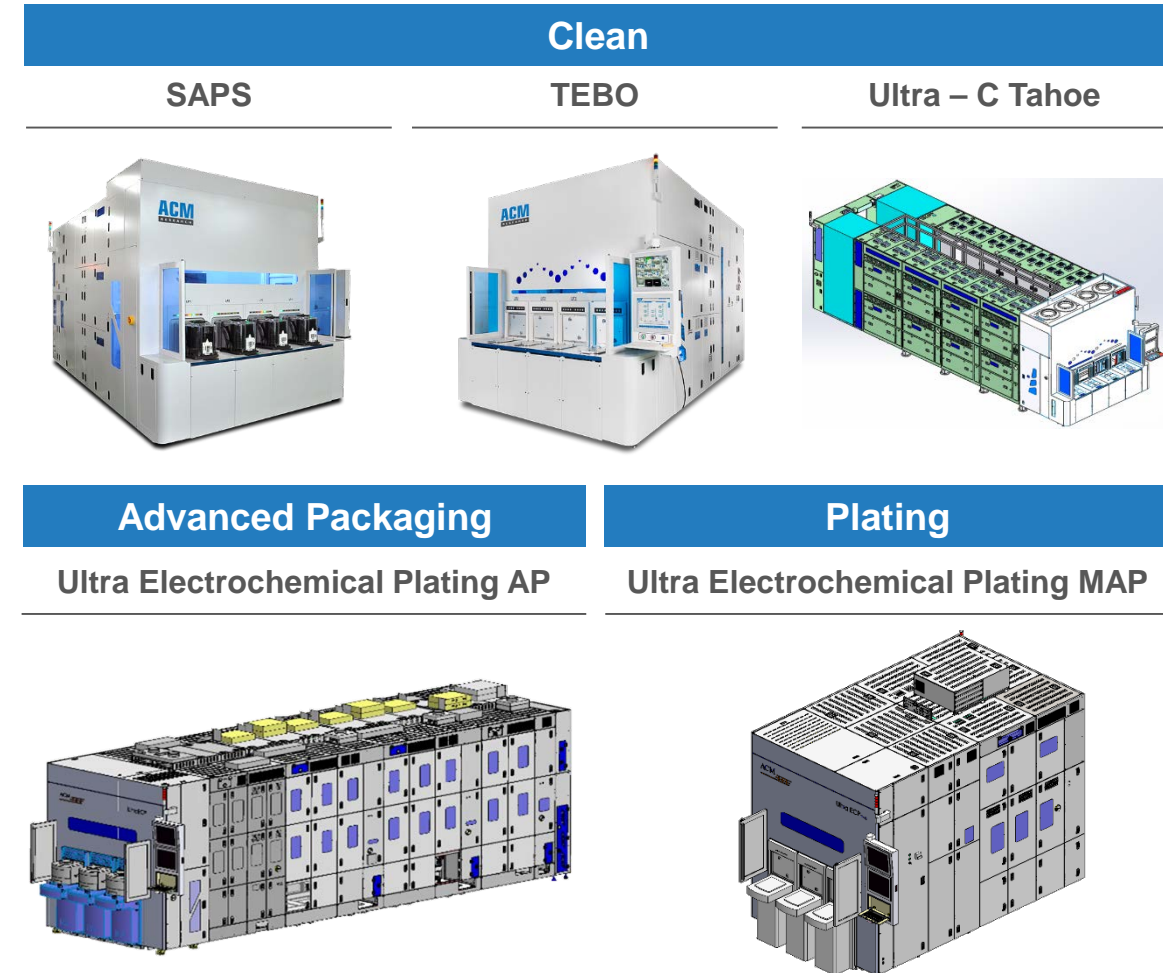
**Note Regarding Presentation of Non-GAAP Financial Measures.** Information presented below under “ACM is Growing at a Rapid Pace,” “...Resulting in Impressive Financial Results,” “Q3 2019 Operating Highlights” and “Strong Balance Sheet and Free Cash Flow Q3 Financial Results” includes certain “non-GAAP financial measures” as defined in Regulation G under the Securities Exchange Act of 1934, including Adjusted EBITDA, Adjusted Net Income, Adjusted Operating Income and Free Cash Flow. A reconciliation of each non-GAAP financial measure to the most directly comparable GAAP financial measure is included under “GAAP to Non-GAAP Reconciliation.”

# Who is ACM Research?

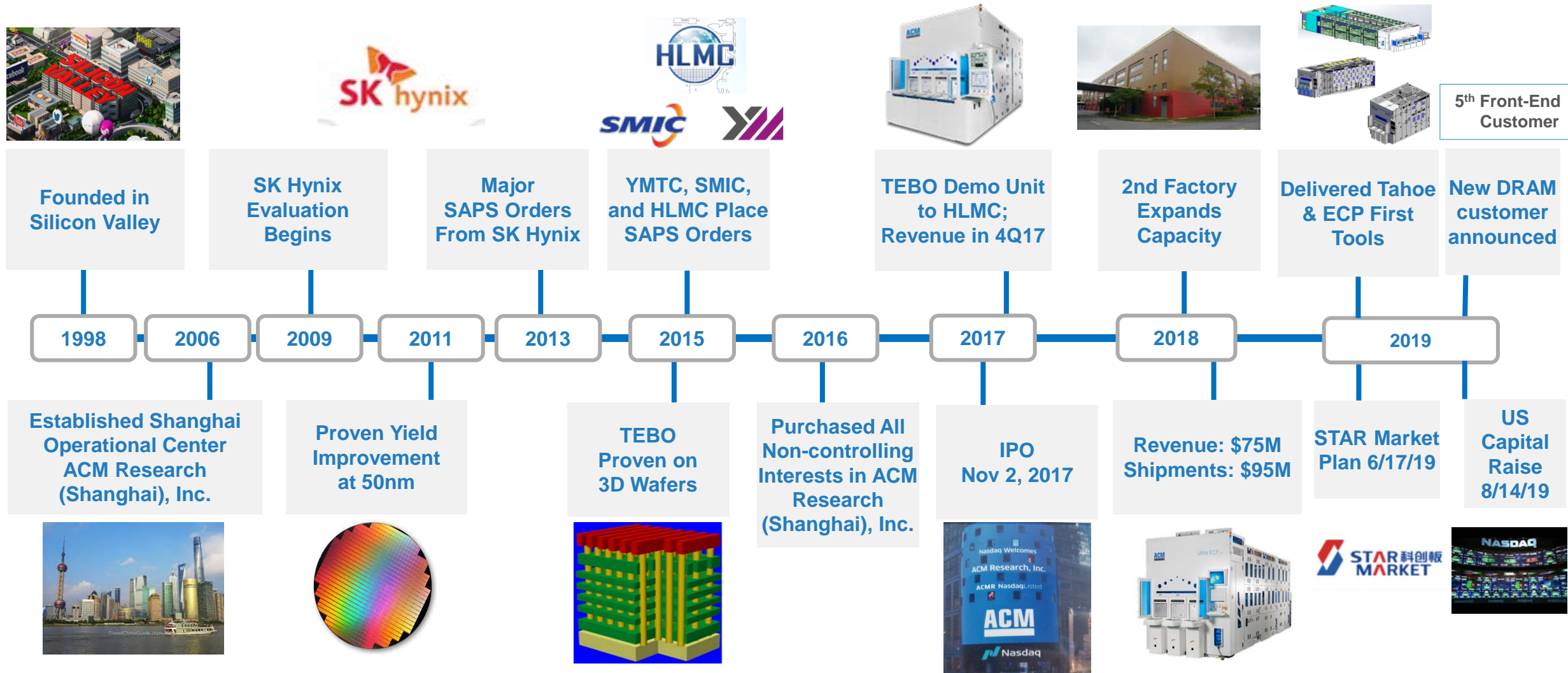
**Mission Statement: To Become a Leading Global Provider of Semiconductor Capital Equipment**

- **Best-in-class semiconductor wafer cleaning tools** providing higher yields and better efficiency at advanced fabs than conventional wafer cleaning tools
- **Differentiated megasonic technology** delivers highly effective single-wafer wet cleaning for flat and patterned wafer surfaces (SAPS) and damage-free cleaning for 2D and advanced 3D patterned wafers (TEBO)
- **~\$3B single-wafer wet cleaning TAM<sup>(1)</sup>**, an estimated 50% of which is addressed by current products with future expansion from new products
- **More than 220 patents** issued in the U.S., China, Japan, Korea, Singapore and Taiwan as of 9/30/19
- 86,000 sq. ft. across **two production facilities in Shanghai** offers significant capacity for growth
- **Headquartered in Fremont, CA** with more than 270 employees globally

(1) Source: Gartner – 2018 Auto Wet Stations, Single-Wafer Processors and Other Clean Process markets.



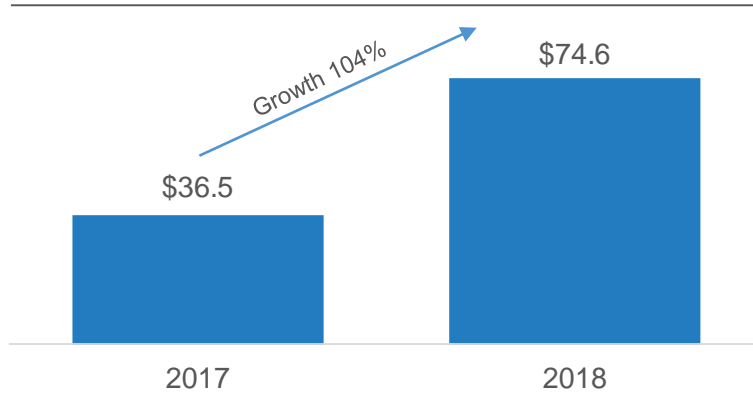
# History of Innovation & Customer Adoption



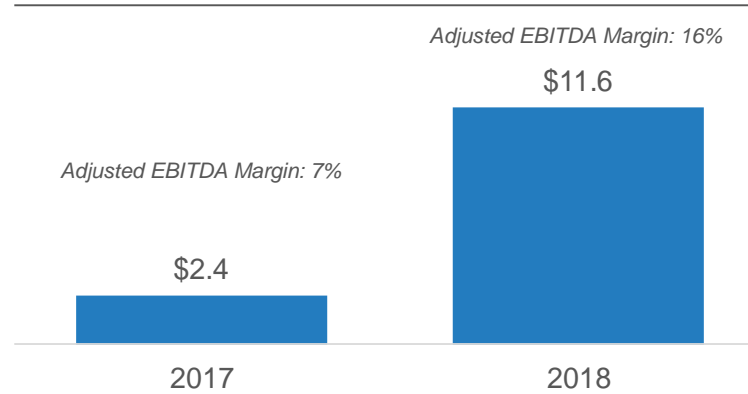
# ACM is Growing at a Rapid Pace

(\$ in millions)

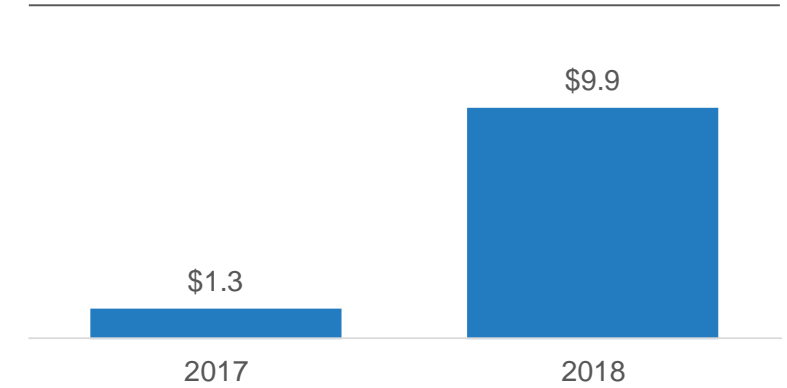
## Revenue



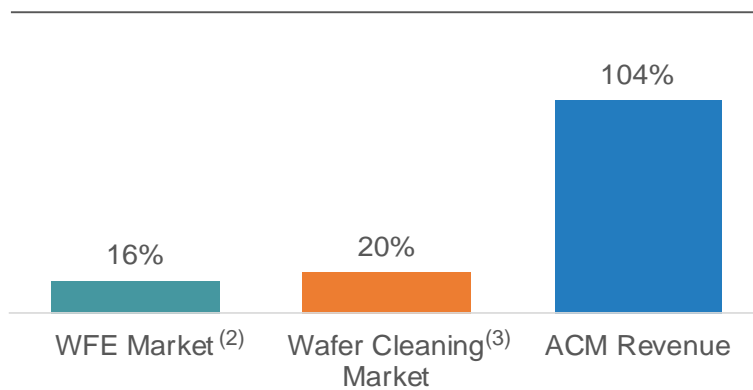
## Adjusted EBITDA <sup>(1)</sup>



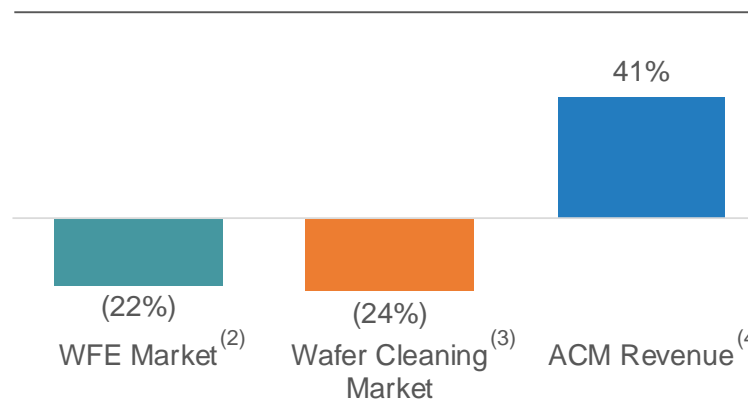
## Adjusted Net Income <sup>(1)</sup>



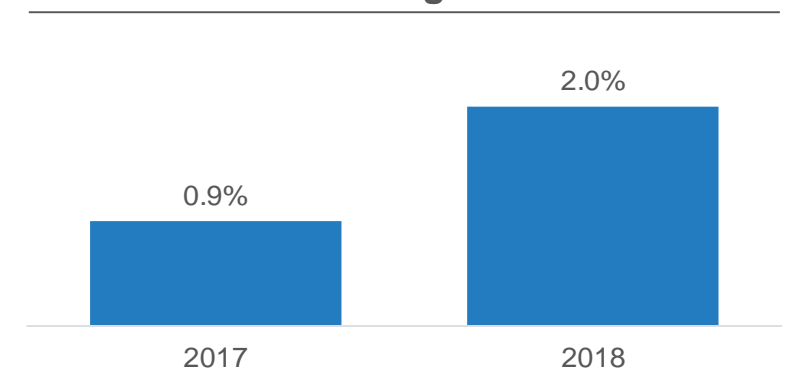
## 2017 – 2018 Growth



## 2018 – 2019E Growth



## ACM Wafer Cleaning Market Share <sup>(5)</sup>



(1) Based on non-GAAP financial statistics. (2) Source: Gartner – Global Wafer Fab Equipment Market (Including Wafer-Level Packaging). (3) Source: Gartner – Auto Wet Stations, Single-Wafer Processors and Other Clean Process markets. (4) As of 11/7/19, ACM Research expected 2019E revenue to be approximately \$105 million. (5) Calculated as ACM Research wafer cleaning revenue / Wafer Cleaning Market size in each respective year.

# What is Wafer Wet Cleaning?

Wafer cleaning is a critical process in wafer fabrication that is repeated more than any other process

- Random defects arise during virtually all process steps in the wafer manufacturing process, resulting in yield loss and impaired chip performance
- Cleaning is the process of eliminating random defects on wafers
- There are two basic types of cleaning: wet cleaning and dry cleaning
- Cleaning typically occurs between other process steps (e.g., etch, deposition)

## Key Benefits

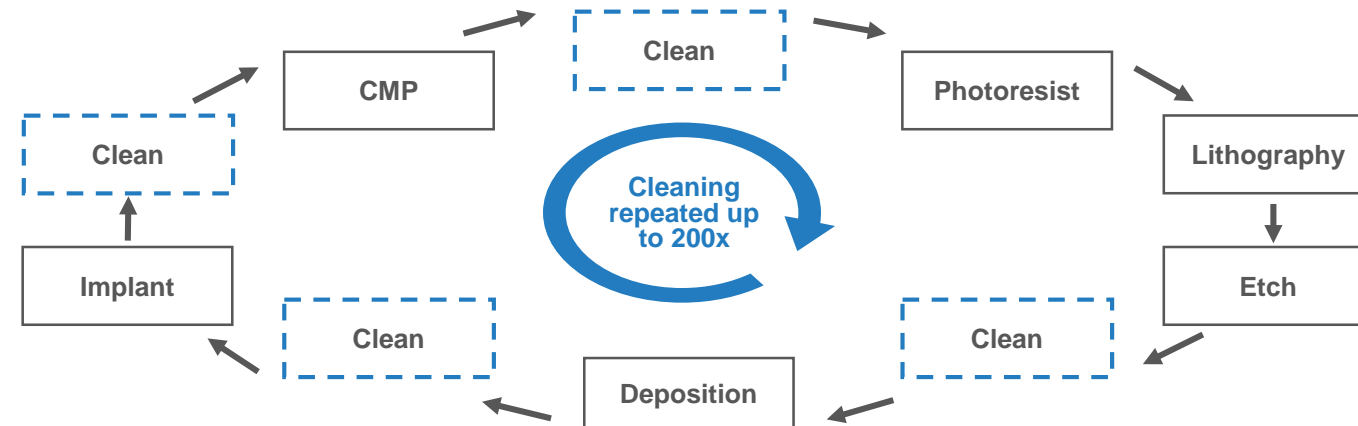
- ✓ Improved Yield
- ✓ Customer Satisfaction
- ✓ Reduces Costs
- ✓ Extends Moore's Law

## Wet Cleaning

- Uses liquid chemistry to spray, scrub, etch and dissolve random defects
  - ▶ Liquid chemistries include combinations of solvents, acids and water
- More effective than dry cleaning in achieving surface cleanliness and smoothness

**~90% of cleaning steps in wafer fabrication**

## Front-End Processing Steps

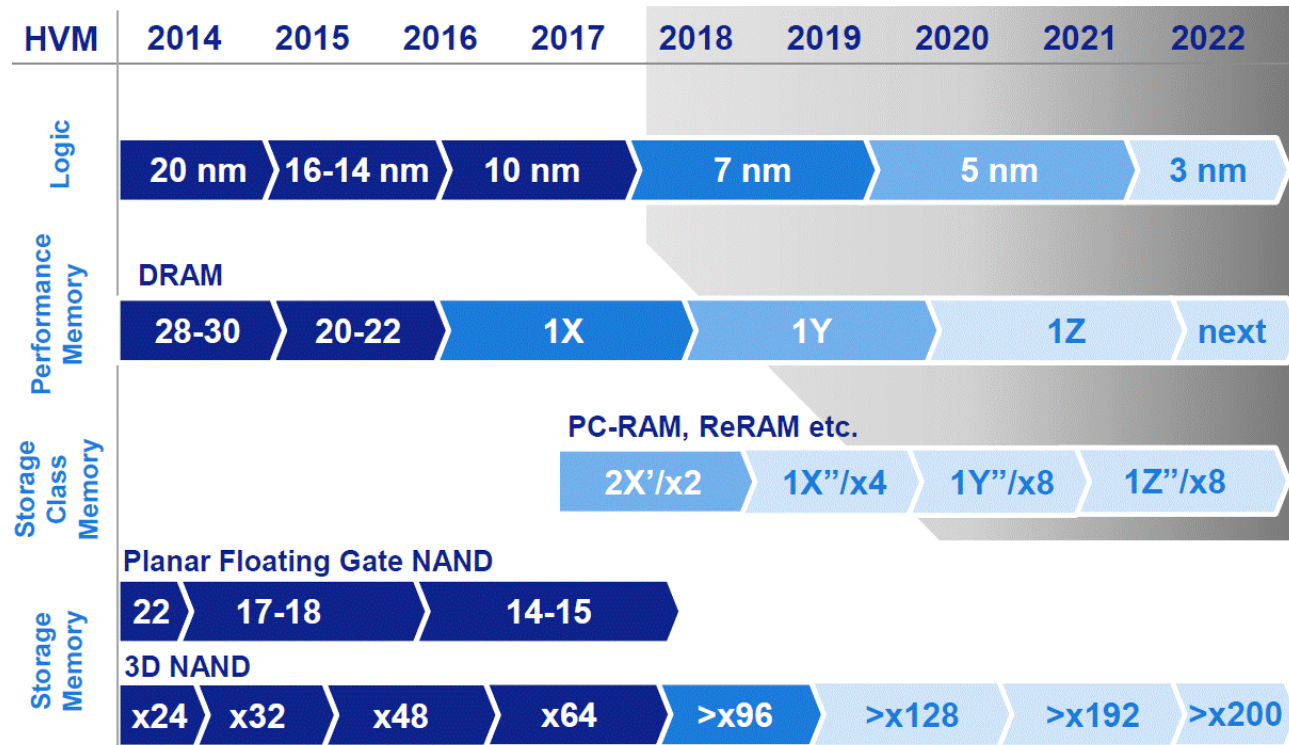




# Semiconductor Roadmap Requires More Advanced Cleaning Capabilities

ACM products drive yield benefits across logic, NAND and DRAM

## IC Roadmap: Transistor Shrink, FinFETs & Larger Wafers <sup>(1)</sup>



## Key Process Equipment Groups

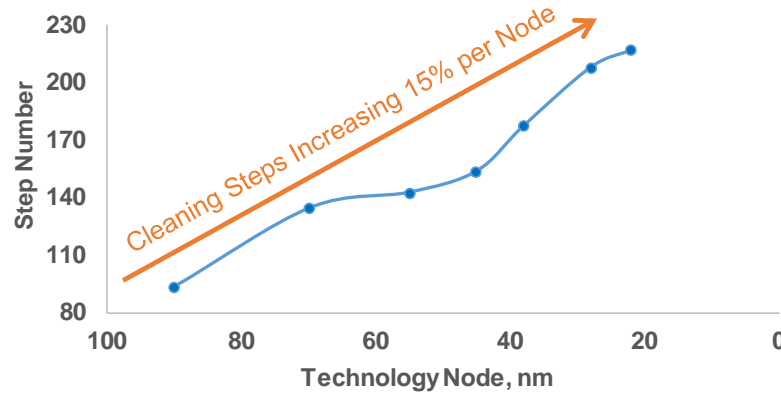
- Implantation
- Deposition
- **Lithography**
- Etch
- **Clean**
- CMP
- Metrology

Most Critical for  
22nm and Smaller  
Node Devices

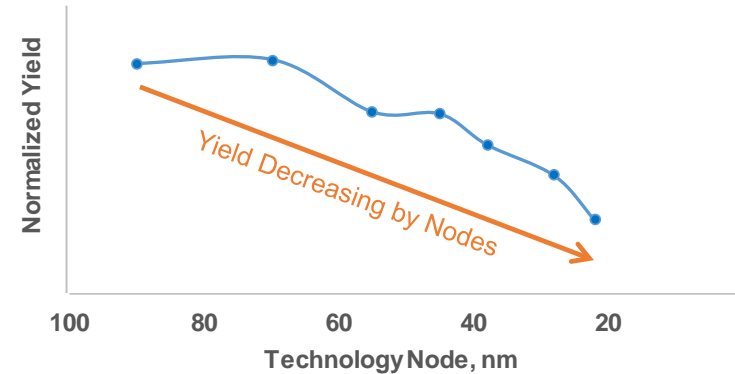
(1) Source: ASML 2018 Presentation.

# Wafer Cleaning is More Important Now Than Ever

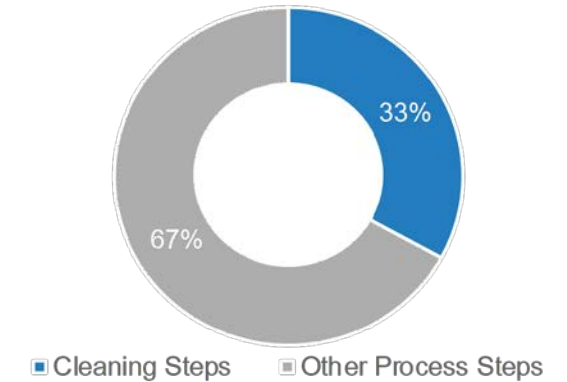
## Total Cleanings Steps



## Wafer Die Yield



## Cleaning Steps vs. Other Processes



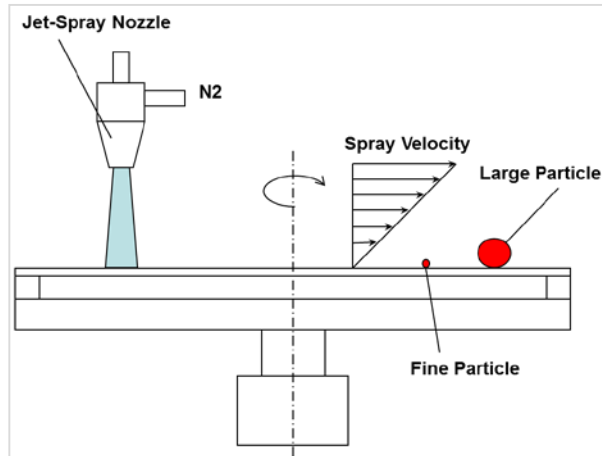
- Eliminating random defects through precise wafer cleaning steps is a critical component of the semiconductor manufacturing process
- Over the past 25 years wafer wet cleaning has become increasingly sophisticated and efficient in order to keep up with the rapid downsizing of device features
- Cleaning steps account for one third of all process steps and can be repeated up to 200 times
- 1% yield loss can lead to annual profit decrease of \$30M to \$50M <sup>(1)</sup>

(1) Source: ACM customer data and ACM estimates.



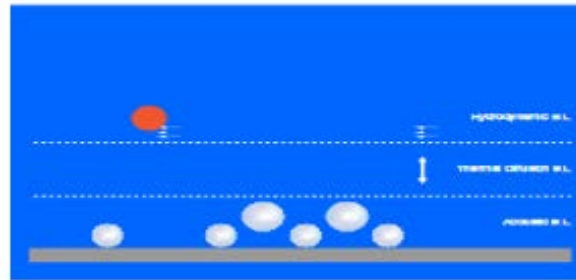
# SAPS Clean Technology: Uniformly Removes Fine Particles/Defects

## Single Wafer Jet-Spray Clean



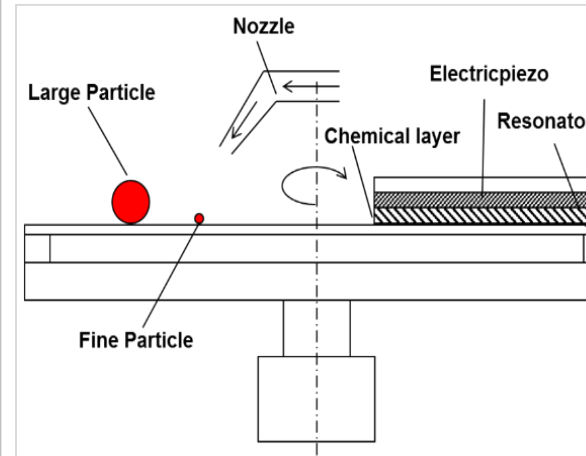
- Legacy solution used in semi-critical steps
- Ineffective in removing small particles at more advanced nodes

## Megasonic Removes Small Particles



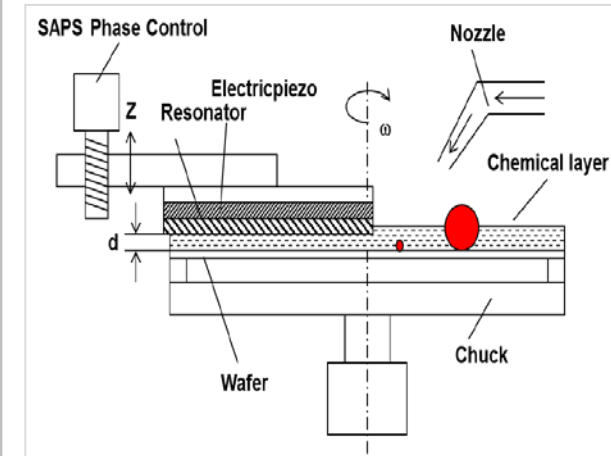
- Megasonic wave creates cavitation
- Cavitation moves particles away from surface

## Conventional Megasonic Clean



- Effectively removes defects below 45nm
- Challenges with warped wafers
- Damage to patterned structures

## ACM Megasonic: SAPS



- Proprietary SAPS ultrasonic design
- Uniform energy delivery
- Proven results for DRAM, 3D NAND, and Foundry processes

# Tier One Customer Base

## Front-End Customers



- Major new entrant into NAND flash and DRAM industry
- Expanding capacity with construction of \$24B production facility in Wuhan<sup>(1)</sup>
- Proprietary Xtacking architecture used to produce 3D NAND products<sup>(2)</sup>
- ACM 2018 Revenue %: 39% (primarily 3D NAND)



- Leading advanced foundry in China
- Manages first fully automated 300mm wafer production line in mainland China<sup>(3)</sup>
- Production capacity for 35,000 wafers per month<sup>(4)</sup>
- ACM 2018 Revenue %: 24% (primarily Foundry / Logic)



- Global market leader in memory (DRAM & NAND) semiconductor products
- ACM's first major customer
- Expected to spend \$107B in the coming years to build four new memory chip plants<sup>(5)</sup>
- ACM 2018 Revenue %: 23% (primarily DRAM)

## Back-End Customers



- Largest bumping house in China and leading WLCSP production base
- Subsidiary of OSAT company JCET
- Owns one of the most advanced packaging technology R&D service platforms<sup>(7)</sup>
- Global customer base with exposure to the U.S., Western Europe and Asia



- Mainland China's largest foundry
- Tier one customer base including Qualcomm, Broadcom and Texas Instruments
- Six strategically located fabs in China and Western Europe
- Building \$10B fab to produce 14nm, 10nm and 7nm chips<sup>(6)</sup>

## New DRAM Customer

- New China-based entrant to DRAM industry
- Ordered 12-Chamber SAPS-V tool for evaluation
- ACM expects to deliver first-tool in Q4 2019, with revenue recognition upon acceptance



- Leading OSAT provider – #7 globally<sup>(8)</sup> and top 3 in China<sup>(9)</sup>
- Fastest growing OSAT provider globally with 32% year-over-year revenue growth<sup>(8)</sup>
- Six production facilities serving more than half of the top ten global semiconductor manufacturers<sup>(9)</sup>

(1) Source: Nikkei Asian Review. (2) Source: YMTC Press Release. (3) Source: HLMC Press Release. (4) Source: HLMC Press Release. (5) Source: Reuters. (6) Source: AnandTech. (7) Source: JCAP Company Profile. (8) Source: Electronics Weekly. (9) Source: TFME website.

# Single-Wafer Wet Cleaning Products

Innovative, patent-protected tools address critical challenges in leading edge IC manufacturing

## SAPS



*Megasonic Cleaning for  
Flat and Patterned Wafer  
Surfaces*

- ✓ High efficiency with enhanced process flexibility
- ✓ Uniform and consistent results
- ✓ Customizable specifications

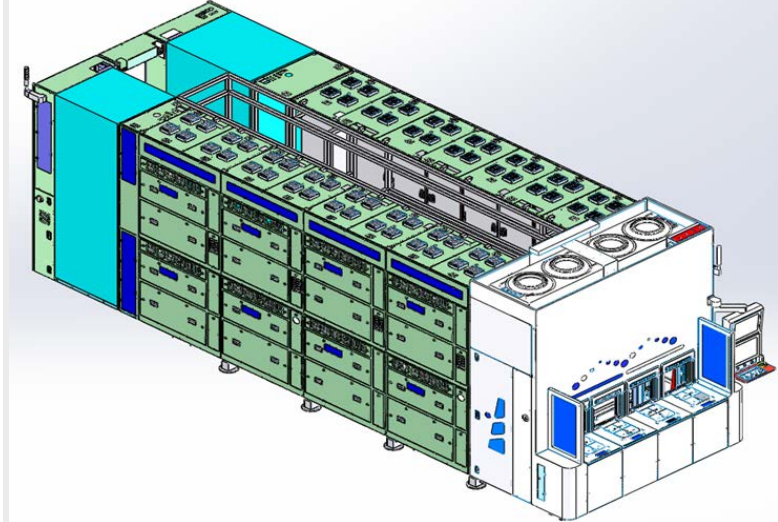
## TEBO



*Bubble Oscillation Cleaning for  
Patterned Wafers at Advanced  
Process Nodes*

- ✓ Highly effective, damage-free solution for small and fragile features
- ✓ Multi-parameter bubble cavitation control

## Ultra – C Tahoe



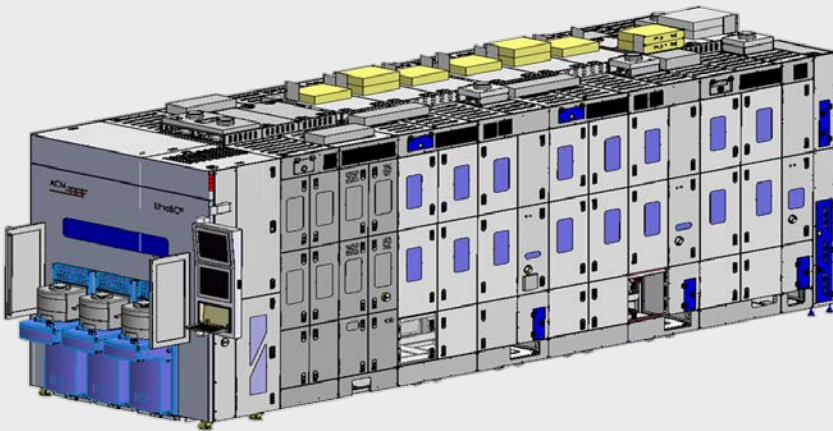
*Hybrid Wafer Cleaning With Significant  
Cost & Environmental Benefits*

- ✓ Environmentally friendly – uses 1/10 of the sulfuric acid used than conventional tools
- ✓ High cleaning performance at low cost

# New Electrochemical Plating Products Significantly Increase TAM

Delivers significant benefits to customers, including greater performance, increased flexibility and improved cycle times

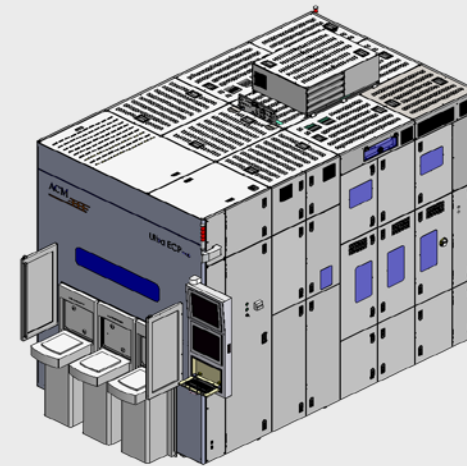
## Ultra ECP AP



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

- ✓ Back-end assembly tool used for applying copper, tin and nickel to wafers at the die level before packaging
- ✓ Produces uniform and consistent results

## Ultra ECP MAP

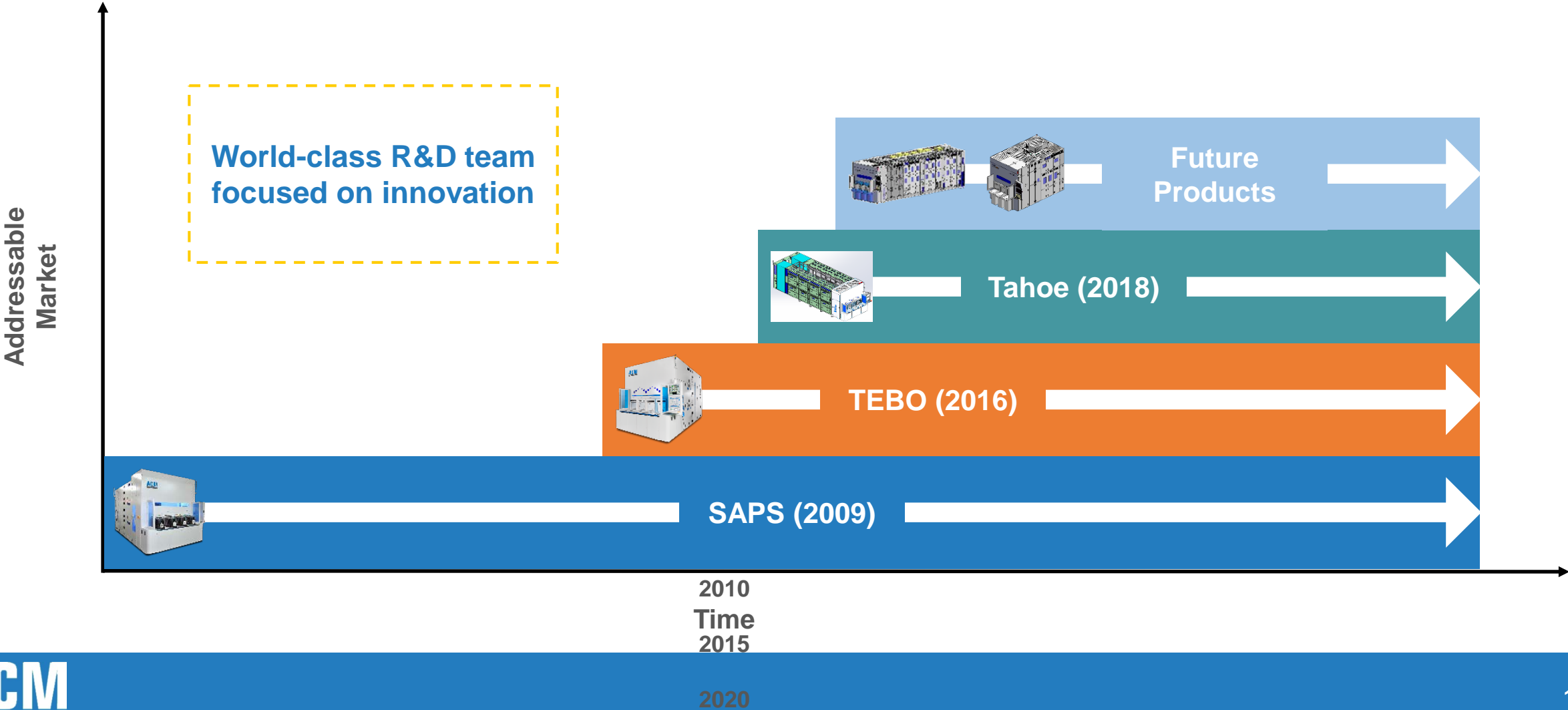


*Multi Anode Partial Plating  
(Front-End Wafer Fabrication Processes)*

- ✓ Delivers world-class electrochemical copper plating for advanced copper interconnect applications
- ✓ Offers significant performance advantages relative to competitors

# Innovation and Product Introductions Expanding Addressable Market

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

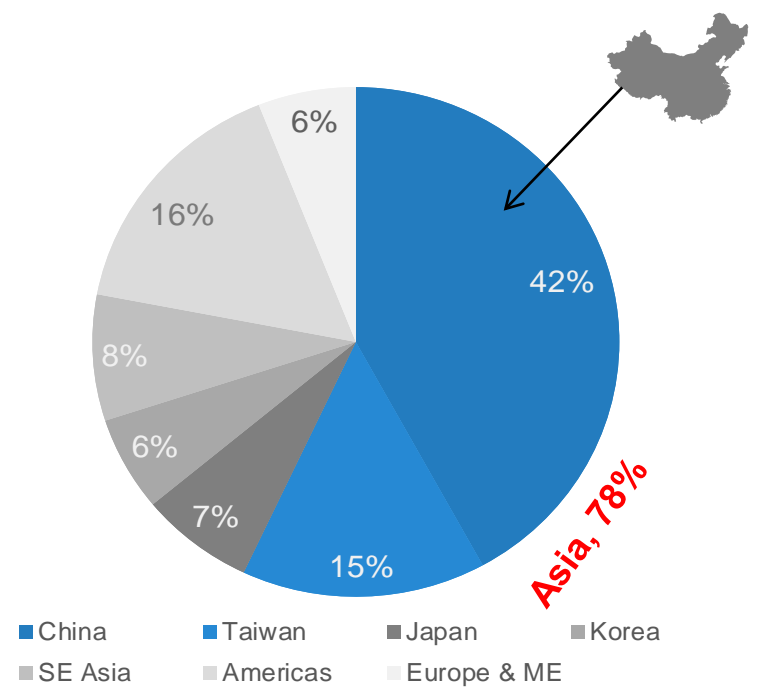


# Well-Positioned to Participate in Asia Fab Investments

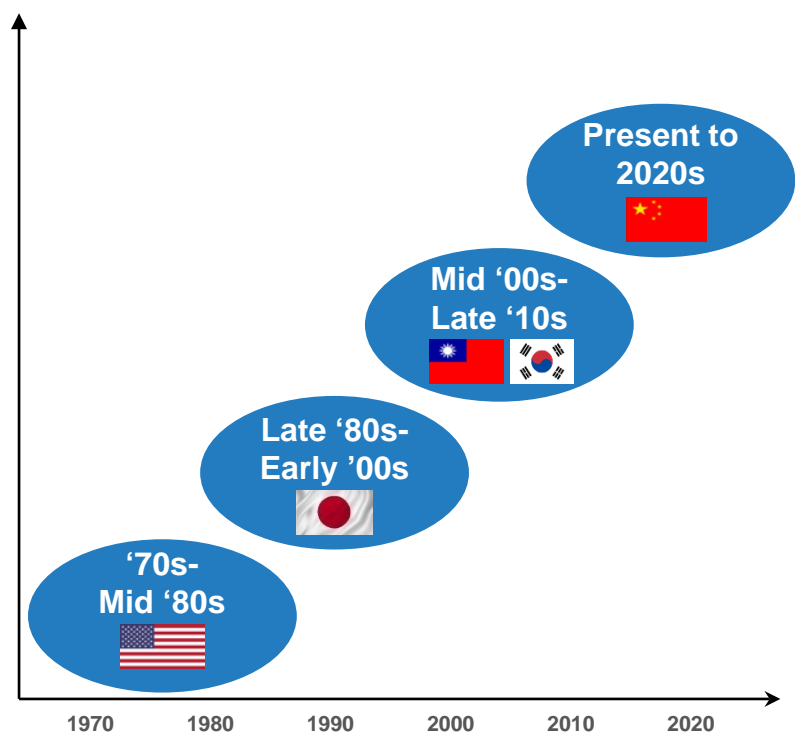
## Semiconductor Industry Development

(\$ in billions)

New Facilities and Production Lines Starting Operation (2017-2020)<sup>(1)</sup>



Industry Center Shifts Through the Decades<sup>(1)</sup>



China is the Largest and Fastest Growing Geography<sup>(2)</sup>

Rank	Country	2020 Size	'16-'20 CAGR
1		\$14.5	22%
2		11.8	11%
3		11.6	(1%)
4		9.0	18%
5	North America	5.2	4%
	Rest of World	6.8	4%



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

(1) Source: SEMI – World Fab Forecast Report. (2) Source: SEMI – Equipment Market Data.



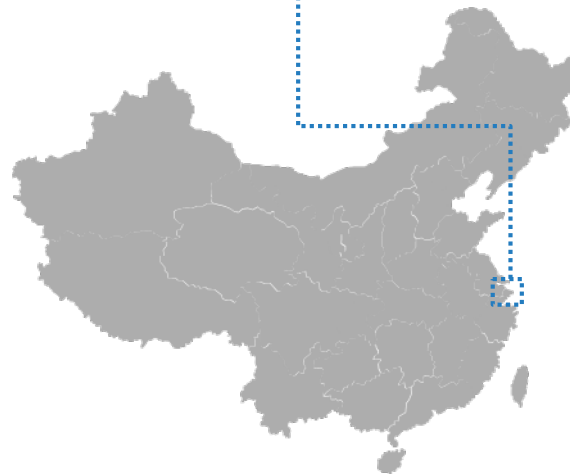
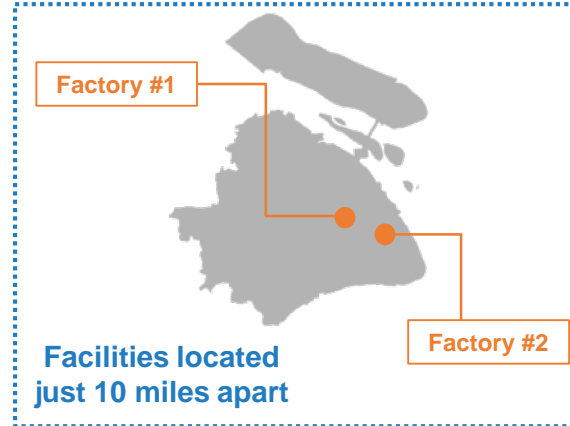
# Shanghai Manufacturing Facilities

## Factory #1 (Shanghai HQ)



- Original ACM factory
- 36,000 sq. ft. facility
- 8,000 sq. ft. of class 10,000 clean room space for product assembly and testing
- 800 sq. ft. of class 1 clean room space for product demonstration purposes
- Co-located with ACM Shanghai Headquarters and China R&D Center

## Shanghai Locations



## Facility #2

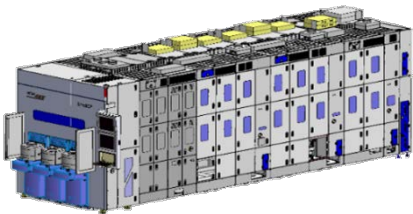


- Second factory; opened in September 2018
- 50,000 sq. ft. facility
- Shifting large portion of future production to this facility
- Additional dedicated space for product sub-assembly, component inventory and manufacturing related offices
- 2nd floor available for additional expansion

# Growth Strategy

## New Product Introductions Increasing TAM

- Next generation TEBO and Tahoe products expand SAM in wafer clean
- Front- and back-end plating tools offer growth opportunities in adjacent process steps



## Continue to Build Scale in Asia

- Gain meaningful share by offering differentiated, leading edge technology and localized service with fast-growing Asian-based customers



## Add New Customers

- Megasonic approach driving meaningful engagement with Global Tier 1 foundry, logic and memory companies



## Selective Acquisitions

- Use M&A to broaden product portfolio, add complementary technologies and increase access to the global market



# Strategic Investment Plan – Access China’s Capital Markets

- **Announced in June 2019**
- **Plan to list shares of ACM Research (Shanghai), Inc., the principal operating subsidiary of ACM Research, on Shanghai Exchange’s Sci-Tech innovAtion boARd (“STAR Market”)**
  - ▶ Direct access to local capital to support China operations
  - ▶ Relatively attractive valuation vis-à-vis current NASDAQ trading prices for ACM Research common shares
  - ▶ Raise profile within the business and investment communities
- **\$27.3 million\* private placement first step to qualify for STAR Market listing**
  - ▶ \$23.5 million\* to be invested from third-party investors at **\$675 million\*** pre-money valuation
  - ▶ \$3.8 million to be invested from ACM employees at a discount
  - ▶ Potential for STAR Market premium to enable significant capital raise at just 20% dilution
- **ACM Research remains committed to NASDAQ listing status and global market opportunities**

\*Based on China RMB to US dollar exchange rate on 6/12/2019, the effective date of the agreement.

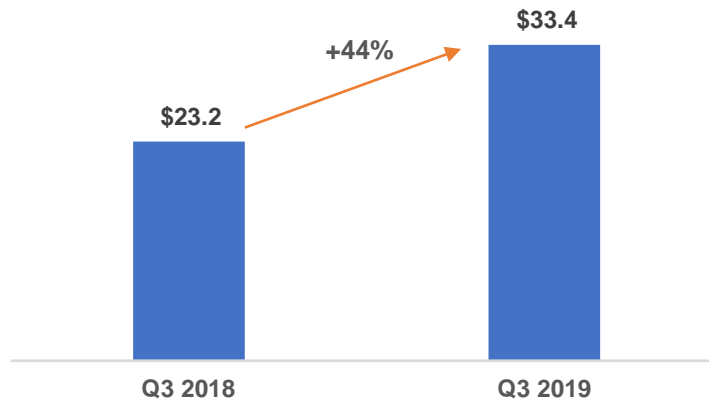
# Q3 2019 Operating Highlights

- **Solid Q3 Results**
  - \$33.4 million revenue, up 44% from Q3 2018
  - 48.6% GAAP gross margin and 21.0% GAAP operating margin
  - 49.1% non-GAAP gross margin and 25.7% non-GAAP operating margin
- **Total shipments of \$43 million in Q3 2019**
  - Increase of 34% from Q3 2018
- **Key operational progress:**
  - Delivered SAPS-V “first tool” to a new DRAM customer in China
  - Technical trials of Ultra-C Tahoe demo tool are progressing well
  - Delivered several Ultra ECP AP “first-tools” to a major key packaging customer
- **\$47 million cash and equivalents**
  - Balance sheet better matches ACM to customer base and opportunity
  - Successful U.S. capital raise in Q3 2019
  - Does not include segregated cash raised from China PE investors in connection with proposed STAR Market listing

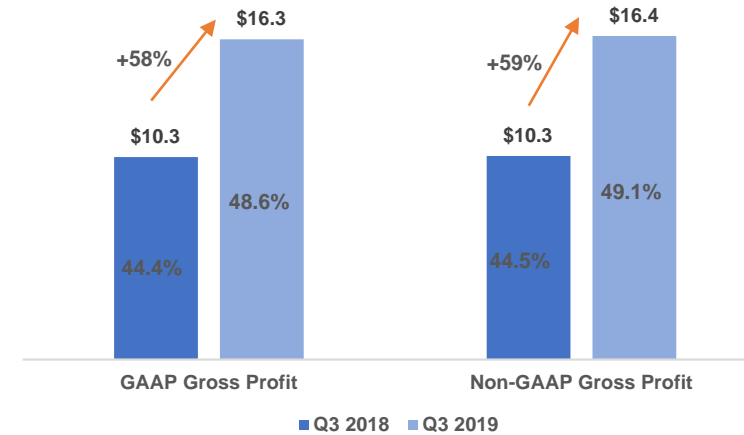
# Q3 2019 Financial Results

\$ Millions, non-GAAP gross profit and operating profit

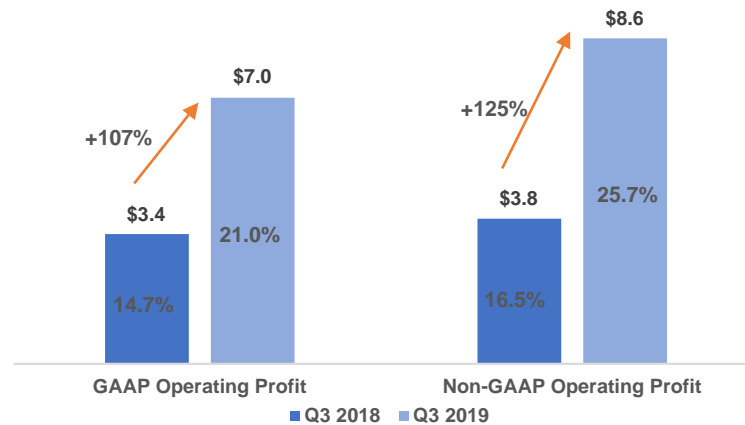
## Revenue



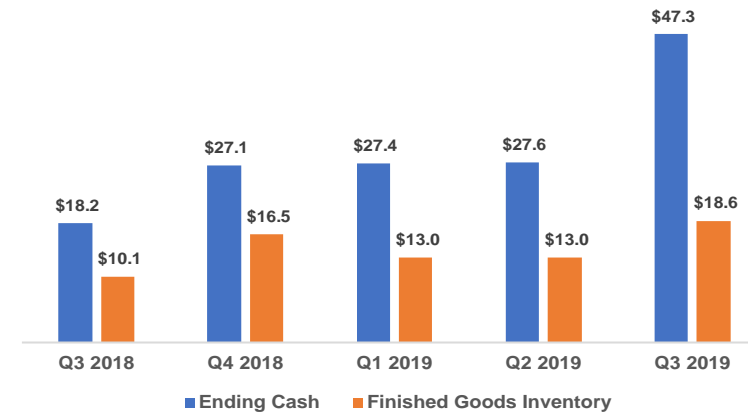
## Gross Profit



## Operating Profit

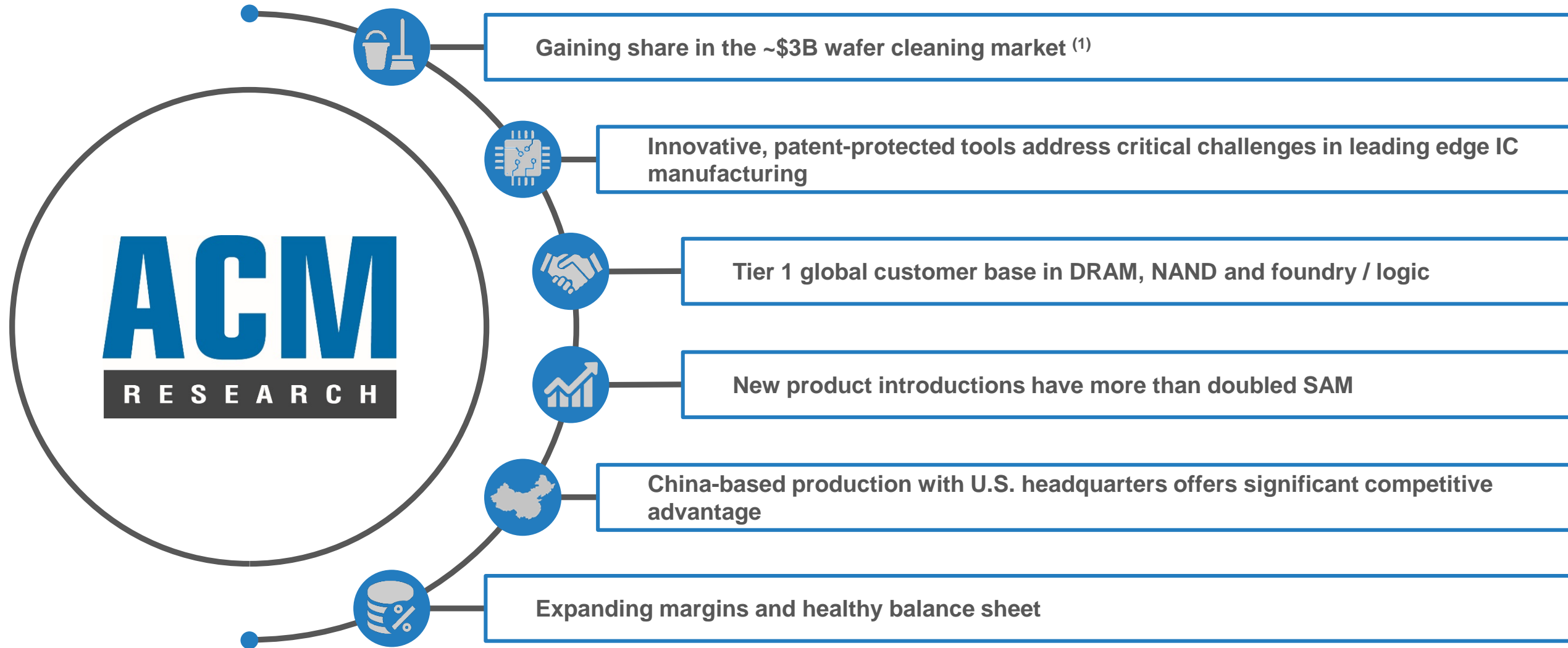


## Balance Sheet Data\*



\* Finished goods inventory represents 'demo-to-sales' product which have been delivered to customers for evaluation. These products are carried at cost until ownership is transferred.

# Investment Highlights



(1) Source: Gartner – 2018 Auto Wet Stations, Single-Wafer Processors and Other Clean Process markets.



# GAAP to Non-GAAP Reconciliation

(\$ in millions)

	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>YTD 2019</u>
GAAP Income (Loss) from Operations	\$3.5	\$0.7	\$6.5	\$13.9
Plus: Stock-Based Compensation	\$0.4	\$1.6	\$3.4	\$2.9
<b>Adjusted Income (Loss) from Operations</b>	<b>\$3.9</b>	<b>\$2.3</b>	<b>\$9.8</b>	<b>\$16.9</b>
GAAP Net Income (Loss)	\$2.4	\$ (0.3)	\$6.6	\$15.0
Plus: Interest Expense, Net	\$0.2	\$ 0.3	\$0.5	\$0.5
Plus: Income Tax Expense	\$0.6	\$ 0.5	\$0.8	\$0.7
Plus: Depreciation and Amortization	\$0.2	\$ 0.3	\$0.4	\$0.7
Plus: Stock-Based Compensation	\$0.4	\$ 1.6	\$3.4	\$2.9
<b>Adjusted EBITDA</b>	<b>\$3.7</b>	<b>\$ 2.4</b>	<b>\$11.6</b>	<b>\$19.8</b>
GAAP Net Income (Loss)	\$1.0	\$ (0.3)	\$6.6	\$15.0
Plus: Stock-Based Compensation	\$0.4	\$ 1.6	\$3.4	\$2.9
<b>Adjusted Net Income (Loss)</b>	<b>\$1.4</b>	<b>\$1.3</b>	<b>\$9.9</b>	<b>\$17.9</b>

Source: Company filings.