

SEMICON® KOREA MEDIA BRIEFING

A World Class Specialty Materials Company

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AGENDA

01 A World Class Specialty Materials Company

02 Entegris in Korea

03 Q&A

04 Meeting Close



Celebrating our 50th year in business!

YIELD-ENHANCING MATERIALS SOLUTIONS

Entegris provides yield-enhancing materials and solutions for the most advanced manufacturing environments through a unique combination of technology breadth and market focus that is unmatched in its industry

Advanced Chemicals



Filtration and Purification



Materials Handling



Selected peers and competitors

GLOBAL INFRASTRUCTURE WITH LOCAL R&D AND FIELD SUPPORT SERVICES

Entegris is close in proximity to its customers for collaboration and access to services



North America



Europe and Israel



Asia and Japan

U.S.-based company, FY2016 sales of \$1.2 billion, 3,500 full-time employees, publicly traded company (NASDAQ: ENTG)

A TOP-TIER MATERIALS SUPPLIER

Customer Value Proposition

Enabling higher yields, improved performance, reduced cost of ownership

Technology Portfolio



Global Responsiveness

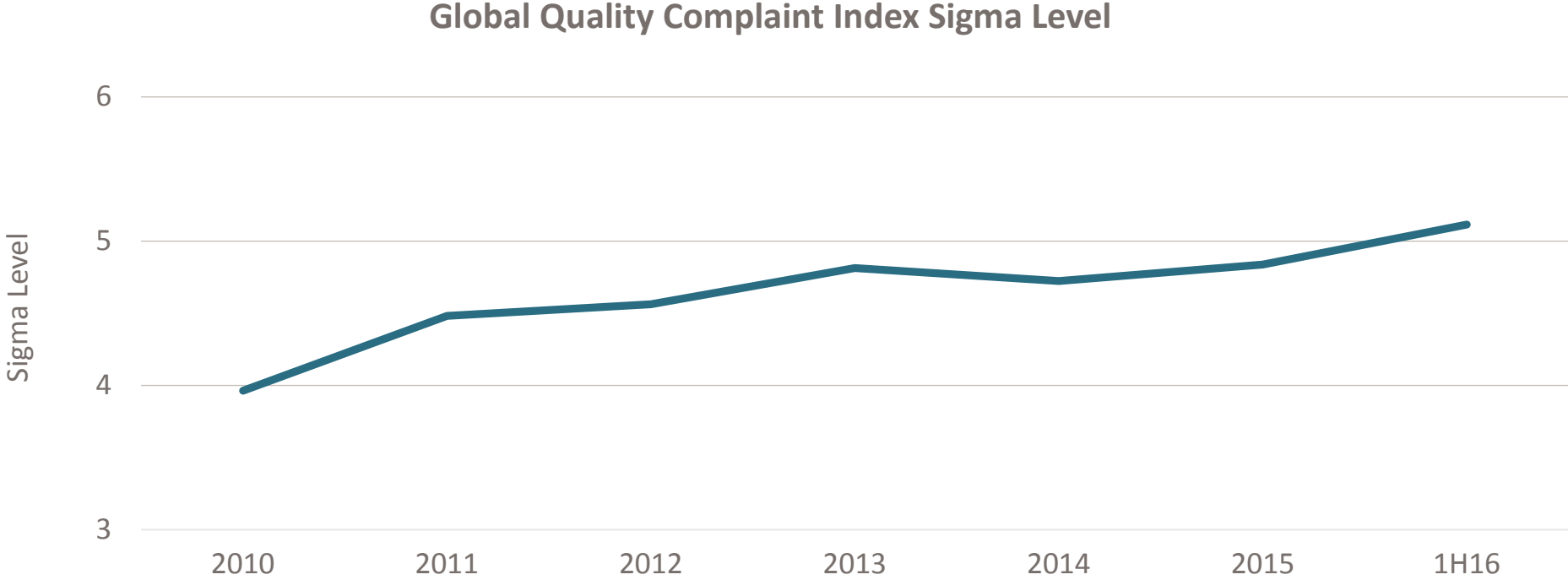


Operational Excellence



Creating value by leveraging best-in-class technology with a global infrastructure and a relentless focus of operational excellence

ACHIEVING WORLD-CLASS QUALITY

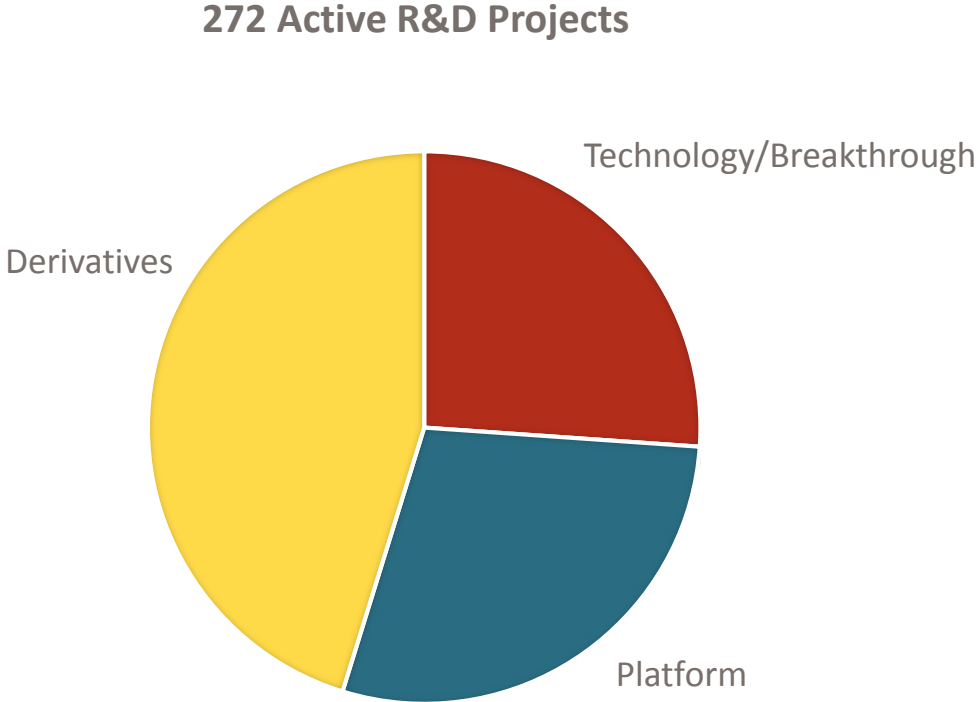
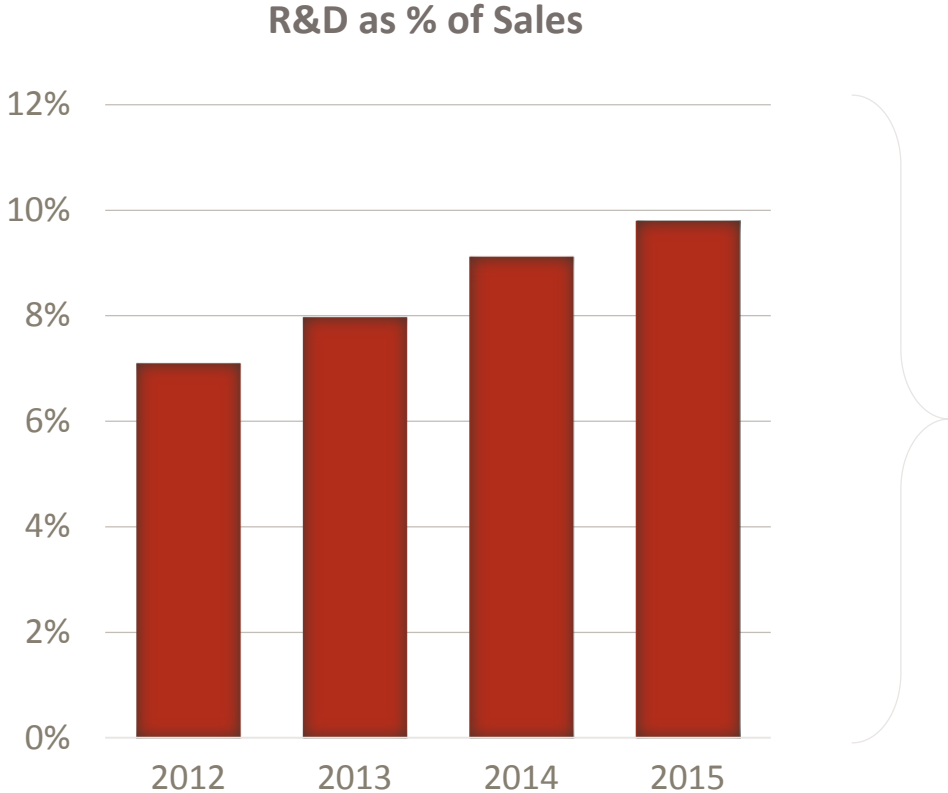


Entegris' quality levels are approaching six sigma best in class

Note: Index reflects numbers of customer complaints

A ROBUST NEW PRODUCT PIPELINE

Strong discipline around managing R&D spending and project performance tracking



A focus on technology/breakthrough projects that yield new products

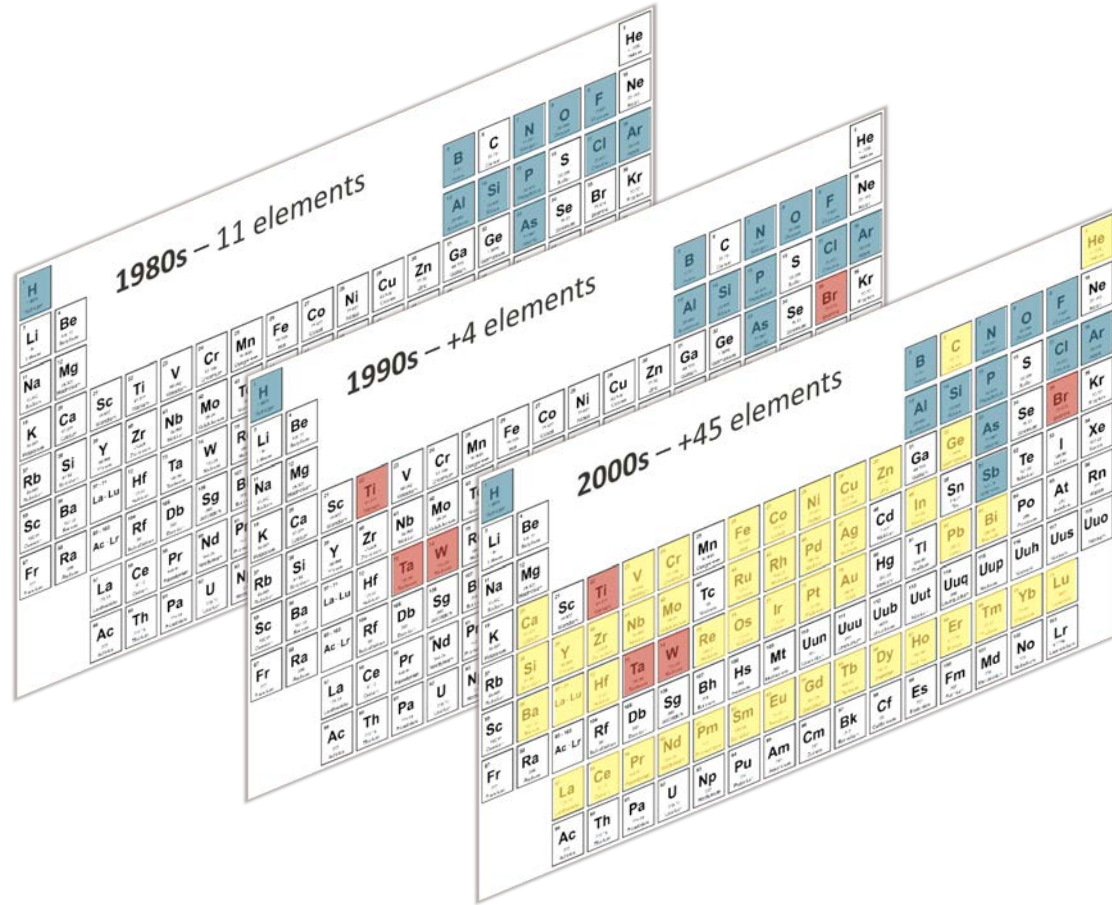
KEY OPPORTUNITIES TO EXPAND SHARE AND SERVED MARKET

Entegris has a rich pipeline of development projects

Top 5 Representative Opportunities	Market Share	Next Application	SAM Expansion
Bulk photochemical filtration	●		●
Boron mixtures for implant		●	
Solid precursors for deposition		●	
Specialized coatings for key applications			●
CMP pad conditioners			●

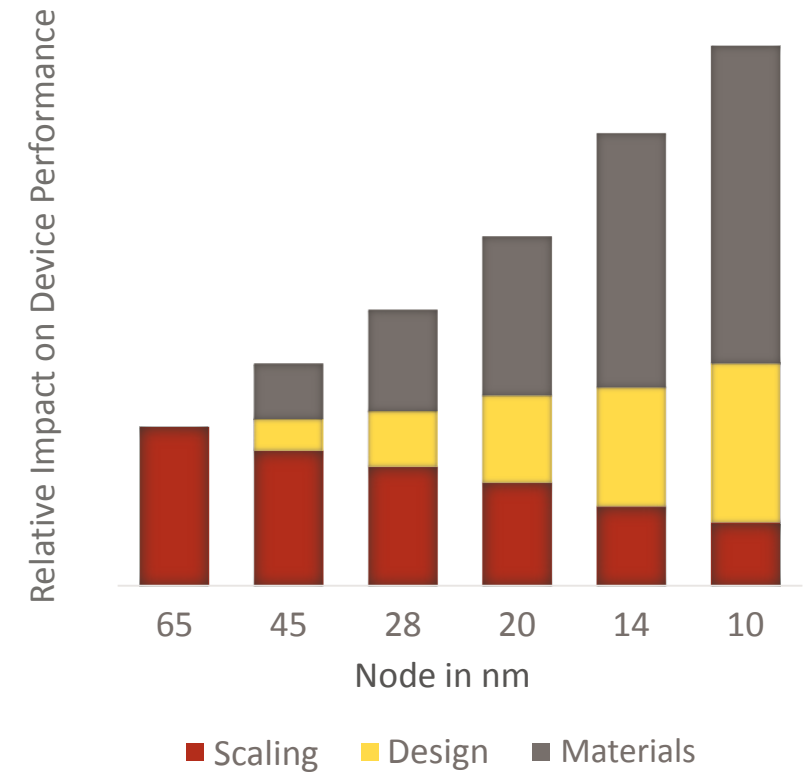
INCREASED IMPORTANCE OF SPECIALTY MATERIALS

Increasing Numbers of Materials are Being Used to Make Semiconductors

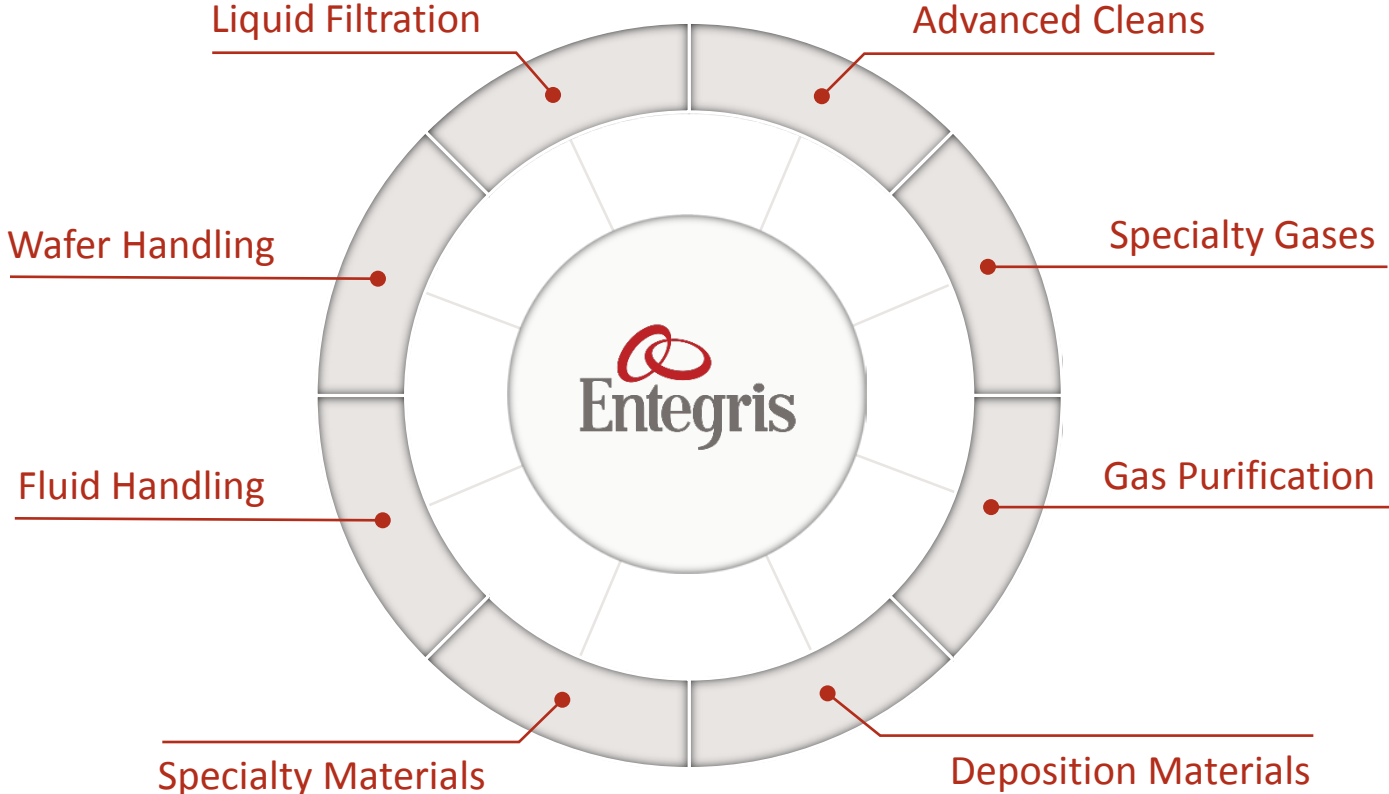


Device Performance Drivers

Use of new innovative materials are having a greater impact on device performance



BROADEST TECHNOLOGY PORTFOLIO IN OUR SEGMENT



COMPREHENSIVE, COMPLEMENTARY TECHNOLOGIES TO SOLVE COMPLEX YIELD ISSUES







Entegris has a unique combination of technology, deep applications knowledge and critical materials science know-how

Implant	Lithography	Deposition	Dry Etch	Wet Clean	CMP	Fab Facility
Safe Gas Delivery Systems	Advanced Photoresist Packaging	CVD/ALD Precursors	Formulated Cleans	Formulated Cleans	Formulated Cleans	Advanced FOUPs
Electrostatic Chucks	Filtration and Dispense	Copper Plating	Gas Filters and Diffusers	Liquid Filtration	Liquid Filtration	AMC Filtration
Gas Purification	Gas/Liquid Purification	Gas Filtration and Purification	Gas Purification	Fluid Handling and Sensing	Pad Conditioners	Bulk Chemical Delivery
Specialty Gases	Reticle Pods	Fluid Handling and Sensing	CVD Precursors and Specialty Coatings	Containers	Fluid Handling and Sensing	Wafer Shippers

Advanced Chemicals	Filtration and Purification	Materials Handling
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UNMATCHED COMBINATION OF BREADTH OF SOLUTIONS AND INDUSTRY FOCUS

Entegris has the broadest solutions set of specialty chemicals, filtration and materials handling solutions in its markets

Selected Competitors	Liquid Filtration	Advanced Cleans	Deposition Materials	Specialty Gases	Gas Purification	Specialty Materials	Wafer Handling	Fluid Handling
	●	●	●	●	●	●	●	●
	●							
			●	●				
					●			
		●						
							●	
								●

ENSURING PURITY ACROSS THE SUPPLY CHAIN

Example: Entegris has solutions to achieve purity of photochemicals – from production to consumption



Contamination can occur at multiple points in a chemical's journey to the wafer

WHY WHAT WE DO MATTERS

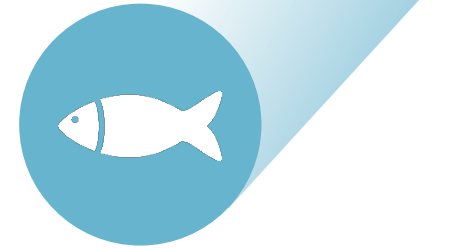
Helping to achieve the most demanding levels of purity possible

Next-generation semiconductor manufacturing requires purity levels measured in parts per quadrillion (PPQ)

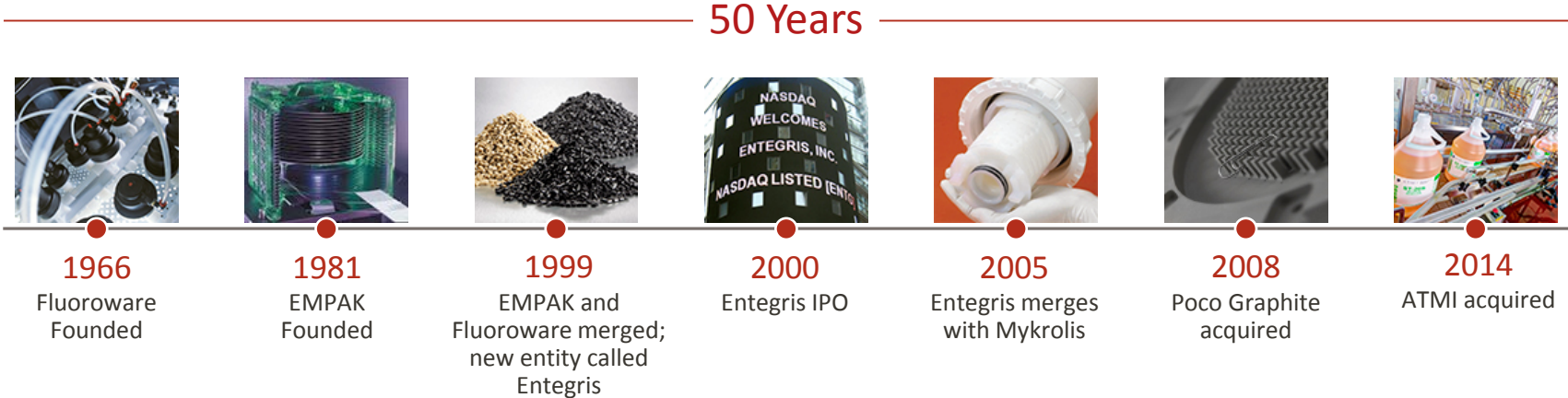
San Francisco bay has
~**6.165 billion** cubic
meters of water



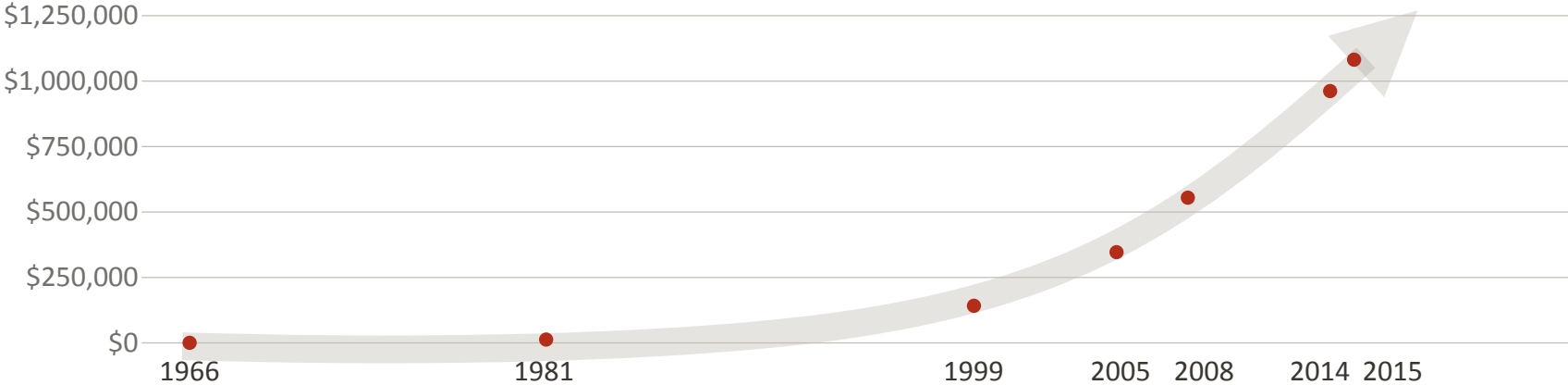
A **PPQ** would be equal to finding **1 minnow** in the entire San Francisco bay



50 YEARS OF PROVIDING MISSION CRITICAL SOLUTIONS



Entegris Revenue 1966-2015



Note: Entegris founded as Fluoroware in 1966. Company became Entegris in 2000. All data is as reported.

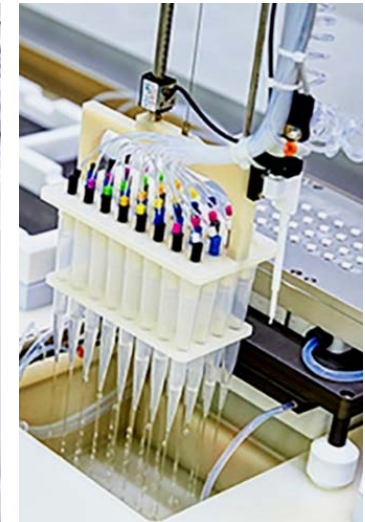
Entegris in Korea



ENTEGRIS IN KOREA

Delivering value to Korea customers since 1990

- Four locations and 200 employees
- State-of-the-art facilities
- World-class solution development
- Top talent and equipment
- Customer co-development models
- Local access and support
- Reduced lead times
- Increased response times



Local capabilities include: Sales, customer service, marketing, engineering, manufacturing and R&D

ENTEGRIS IN KOREA

Manufacturing excellence

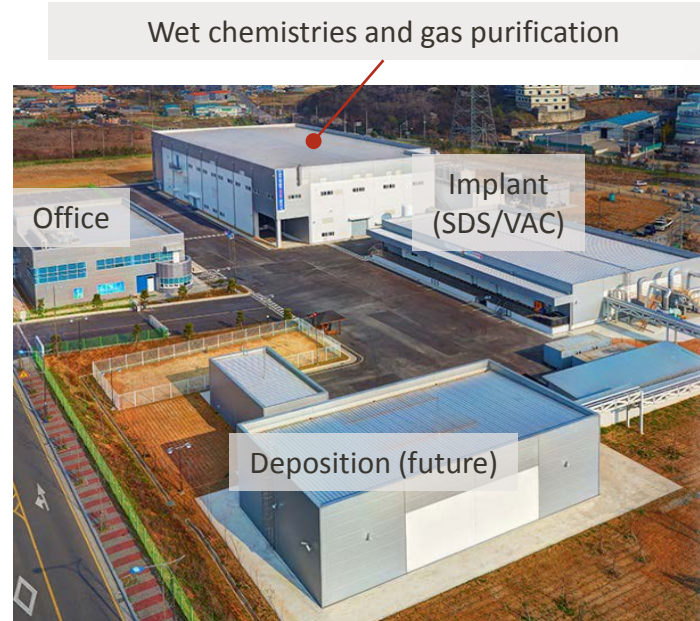
- Wonju Facility
 - Size: 3,650 square meters
 - Employees: 42
 - Products: Fluid management components
 - 2016 focus: Expansion of ESD tube extrusion capability
 - 2017 focus: Capacity and lead time improvement aligned with market needs



ENTEGRIS IN KOREA

Manufacturing excellence

- JangAn Facility
 - Size: 11,000 square meters
 - Employees: 50
 - Products:
 - Implant gases: SDS® and VAC® gas cylinder production
 - Wet chemistries: PlanarClean® AG for post-CMP wafer cleaning at advanced nodes
 - GateKeeper® Gas Purification System (GPS) production
 - 2016 focus: Add GPS production
 - 2017 focus: Achieve high-volume manufacturing of additional cleans products and add capabilities to produce specialty coatings products



ENTEGRIS IN KOREA

Korea Technology Center (KTC)

- Size: 400 square meters, with cleanroom
- Employees: 14
- Capabilities
 - Wet chemistry development lab
 - Deposition chemistry development lab
 - Formulation scale-up (pilot production)
 - On-site metrology and real-time reporting
- 2016 focus: Expand employee base and equipment
- 2017 focus: Customer engagement and product launches for advanced nodes



ENTEGRIS IN KOREA

Our on-going commitment

- Providing a breadth of technologies
- Rapid innovation for advanced processes
- Continued expansion of local customer service and sales support
- Continued collaboration with customers to solve complex challenges
- Create task force for driving greater purity in our solutions
 - Internal/external education on purity and its effect on yield
 - Benchmarking for success stories/BKMs
- Focus on new solutions in Korea
 - Localization – JangAn and Wonju capabilities
 - R&D focus – Specialty chemistries and filters



NEW PRODUCT ANNOUNCEMENT

GateKeeper® Gas Purification System

- Announcing our latest platform for gas purification
- Helps improve wafer yields for advanced semiconductor and LED processes
- Offers best-in-class purification with a small footprint
- Removes contaminants at a parts-per-trillion level and at a variety of flow rates
- It can purify many process stream gases at a much smaller footprint, including Nitrogen, Hydrogen, Hydrogen for EUV, Argon, Ammonia and Clean, Dry Air (CDA)
- Systems provide automated regeneration of purifiers
- **New purifier media allows improved systems to offer best-in-class outlet purity**
- **New manufacturing for these systems has been installed in our JangAn facility for local and regional support**
- **See the new system at our booth!**



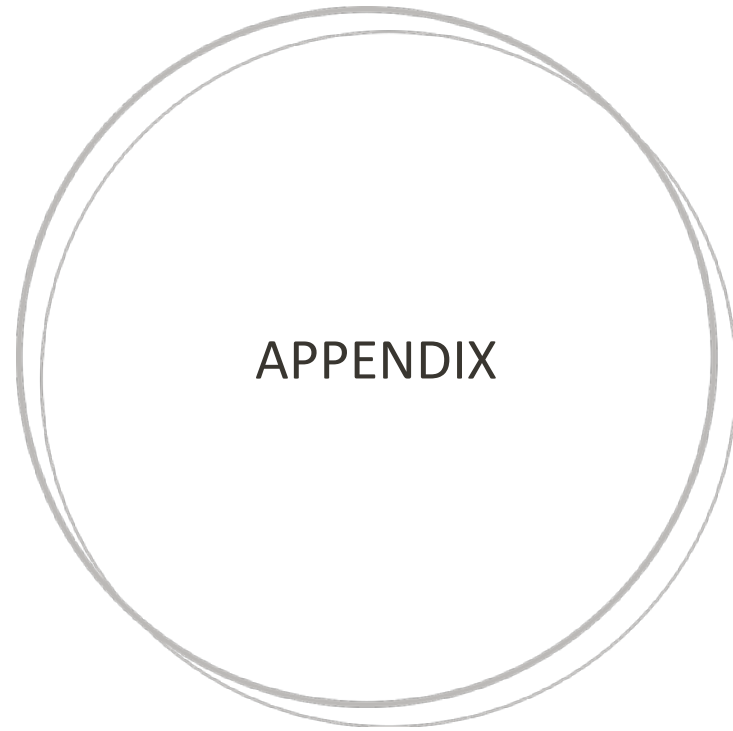
ENTEGRIS AT SEMICON® KOREA

- Stop by our Booth #5504, Hall D
 - See our product display areas for more information on leading technologies designed to maximize process efficiency and yield





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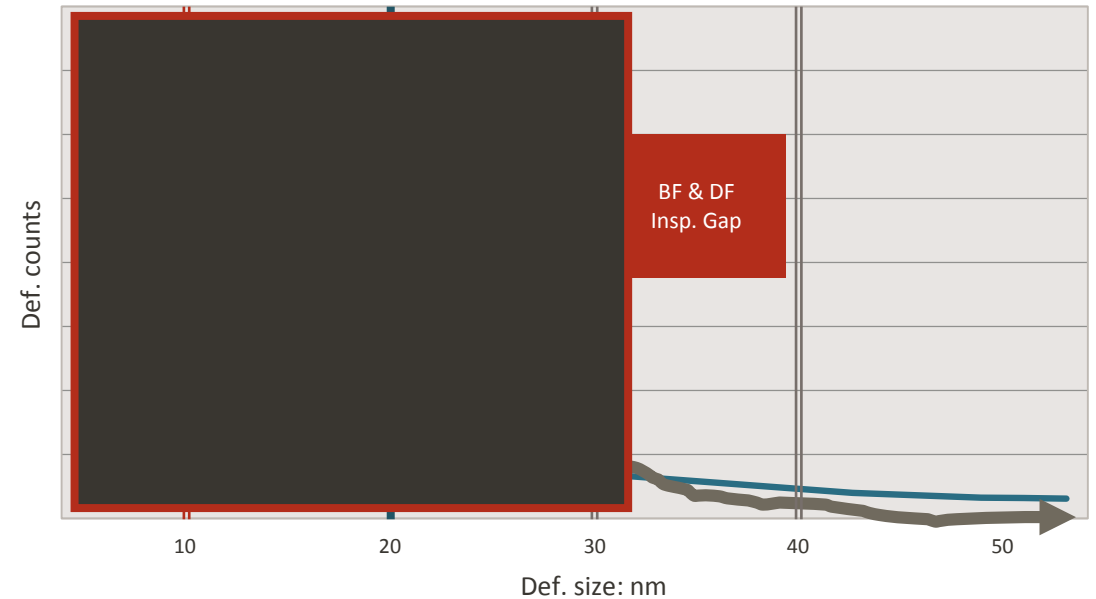


APPENDIX

DEFECTS AT ADVANCED NODES

Defects Size Histogram

- “Black Box” Inspection limitation of 14 nm devices
 - Requires >7 nm defect sizes for 14 nm device (50% of device pitch)
 - “Black Box” getting bigger (now with 40% of 14 nm devices)
- Key Challenges
 - Finding and reducing these defects
 - Gas/chemical materials are the only way to prevent these defects



Limited visibility to contaminants with smaller geometries at advanced nodes

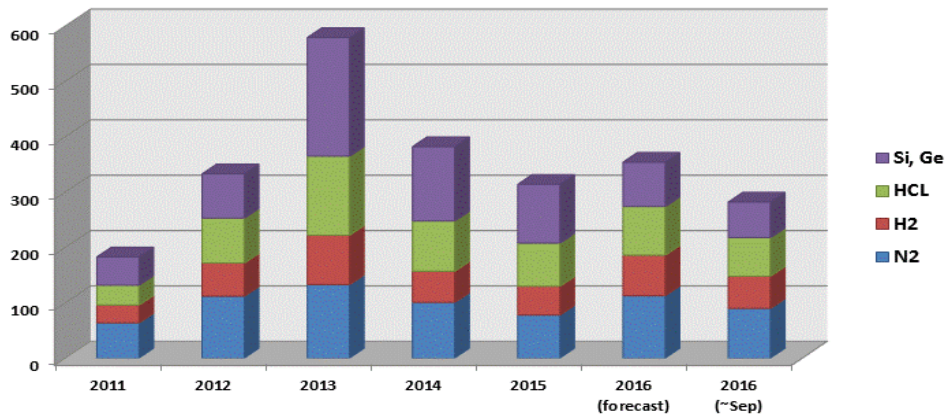
EXAMPLE – GAS FILTER CONSUMPTION RATES

Consumption-Rate Comparison – Filter & Purifier

Gas Filter Consumption for 7 years (2010~2016.Sep)

Gas Filter Top7	Company A: 54,642 E/A								Company B: 12,976 E/A								Gap (A-B)	Grand Total
	2010	2011	2012	2013	2014	2015	2016	Total	2010	2011	2012	2013	2014	2015	2016	Total		
2010~2016.Sep	5,358	4,894	6,250	7,568	11,712	10,979	7,881	54,642	3,785	2,895	2,115	1,608	983	782	808	12,976	41,666	67,618
WG2FT1RR2	2,455	1,926	1,834	2,144	2,768	2,033	1,776	14,936	1,707	2,512	1,470	1,143	695	454	501	8,482	6,454	23,418
WG2FT1SS2	2,255	2,491	2,689	2,618	3,674	4,449	2,369	20,545	143	37	35	85	77	28	132	537	20,008	21,082
WGPM0GGG2			1,112	1,888	4,429	4,032	3,199	14,660						80	91	171	14,489	14,831
WGPM0GGT2		12	240	490	374	122	325	1,563									1,563	1,563
WG3NS3RF2	103	85	91	89	141	52	35	596	49	30	367	175	69	93	25	808	-212	1,404
WGMXMBRR4							1	1	1,333			2				1,335	-1,334	1,336
WG3NS1RR2	88	80	40	41	72	55	25	401	30	68	49	107	44	6		304	97	705

Gas Purifier Consumption for 6 years (2011~2016.Sep)



- Need to consider gas filter replacement frequency
- Gas purification for moisture removal
- Entegris can support to analyze filter replacement frequency