



# electronicsupdate

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## Upside in a Downturn: New Products Paying Off

By Dan O'Connell, Director, Advanced Integration Materials (AIM)



*Air Products has used the downturn of 2009 to advance the development and introduction of new material technologies.*

challenges of excess capacity, less transactions, and other issues.

This temporary respite gives them and us an opportunity to test our new materials and collect necessary data to qualify their use. Although the electronics downturn of 2009 was prompted by a global economic event, it had all the qualities of past downturns. We took advantage of this development to advance introduction of our new material technologies. These efforts are paying off in 2010, and our success in this downturn has laid the groundwork for short- and long-term growth of our portfolio.

In general, we see the role of material science increasing in technology development. In the semiconductor industry, for example, the relentless miniaturization roadmap that makes your laptop and cell phone smaller but more powerful, has created geometries so small, that scientific "tricks" with materials are required to stay on this path.

An example of the Air Products Electronics Division seizing this opportunity is our PDEMS® product, a porous low-k dielectric material. You may have heard about this material technology in the past since it has been in development for many years. It is paying off now. Manufacturing processes based on PDEMS® material are presently ramping at many of our semiconductor customers. The PDEMS® material is an extraordinary technology developed by Air Products scientists and it is playing a vital role in semiconductor manufacturing today.

Another impressive material development for the semiconductor industry by Air Products is the AP-LTO® and AP-LTN® product lines. By leveraging our expertises in molecule design, synthesis, and application support, as well as close partnerships with key OEM's, these product lines meet customer's specific performance and cost targets.

One material technology within this product line provides another scientific "trick" that allows our customers to avoid large capital equipment purchases in their facilities. By purchasing this material technology they can

We are all familiar with the cyclical nature of the electronics industry and the short-term negative impact that a "down cycle" can have. We have also learned that these downturns are prime opportunities to push our new material technologies. During downturns, our customers face the same

## Air Products SunSource™ Solutions Shine in SOLARCON China 2010

By Sunny Chu, Asia Marketing Communications

Air Products participated in SOLARCON China 2010 (Shanghai, China, 16-18 March) and met with customers to promote our latest PV offering—SunSource™ Solutions. We highlighted our broad portfolio of products, extensive industry experience and expertise, as well as our leadership in thin-film transistor liquid crystal display (TFT-LCD) materials that enable PV manufacturing operations to reach faster ramp-up and grid parity.

Besides SunSource Solutions, we also showcased our specialty materials portfolio for the semiconductor industry, including products used in each step of device manufacturing. We highlighted our key offerings, including our Low-k dielectric materials and our XeCover™ Xenon Recovery System, SOLARCON China, in conjunction with SEMICON China (a key semiconductor industry event since 1988), is an important platform for both PV and IC market players to network and learn about new technologies, products and trends. Occupying more than 57,000 square meters in five exhibition halls, the co-located SEMICON/SOLARCON China trade-show this year attracted 36,700 visitors, about 10 percent more than last year's show.

"Recovering from the global economic downturn last year, we see the electronics market has picked up significant momentum. I'm especially optimistic for the fast development of PV, flat panel display and the LED market in China," said Andy Tuan, general manager of Air Products Electronics, China.

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*Air Products Electronics Asia stressed our SunSource™ Solutions for PV manufacturers at SOLARCON China 2010.*

## Air Products to Build New World-Scale Air Separation Unit at La Porte, Texas

Air Products will build a new world-scale air separation unit (ASU) at its La Porte, Texas industrial gases facility. The energy efficient ASU will replace older assets at the site and provide benefits to customers through higher-reliability pipeline oxygen and nitrogen supply, and enhanced production of merchant and electronics products including argon and xenon. The new ASU is to be on-stream in October 2011.

“This world-scale ASU at La Porte will serve customers across Air Products’ three major business areas of Electronics, Tonnage Gases and Merchant Gases and increase supply security and reliability. It will deliver significant productivity

gains through decreased energy consumption and operating costs and supports the company’s sustainability goals,” said Stephen Jones, senior vice president and general manager—Tonnage Gases, Equipment and Energy at Air Products.

The new La Porte ASU will ensure the long-term operational viability and customer supply security of one of Air Products’ key liquid argon sources for the North American market. Argon is used primarily for welding, electronics, steel and metals processing applications.

The plant also will expand Air Products’ xenon production capacity and improve customer supply security and reliability. Xenon continues to grow as a key material used in the etching steps of semiconductor manufacturing, and the additional volume will support growth in the emerging technologies of plasma display and other lighting applications that depend on xenon’s special properties.

La Porte is part of Air Products’ extensive Gulf Coast network of industrial gas facilities, pipelines and distribution assets. In addition to its oxygen, nitrogen and argon businesses, Air Products has the leading hydrogen position in the region comprised of numerous production facilities and over 450 miles of pipelines reaching from the Houston Ship Channel in Texas to Lake Charles, Louisiana, and from the city of Plaquemine, Louisiana to Chalmette, east of New Orleans.

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## First Acetylene Delivery System Sold in Europe

Air Products recently sold an acetylene delivery system to a global independent semiconductor company in Europe. It is the first sale of a delivery system that uses the unique combination of equipment developed specifically for the amorphous CHM (carbon hard mask) application. Air Products has a patent pending for the delivery system that can be comprised of a gas cabinet, a chiller, and a product purifier.

With its combined and extensive experience in industrial gas applications for acetylene and the global electronics industry, Air Products is well positioned to meet expanding acetylene requirements for the semiconductor industry and to solve the process and safety challenges that acetylene presents.

Increasingly, acetylene is used to deposit amorphous CHM film for high aspect ratio etching, which enables decoupling of the etch from the photoresist and extends existing 193nm dry lithography tools for advanced technology nodes as critical dimensions continue to shrink.

Tim Maykut, Air Products EM business development manager, said this process is known as double patterning.

“A major advantage is that this process extends the lithography capability of existing equipment. That allows customers to use existing photolithography for smaller geometries in their lithography and delay investment in new equipment,” said Maykut.

Maykut said Air Products has developed a proprietary system, which includes a specially designed GASGUARD® gas cabinet, cylinder chiller, and purifier. It meets both the process requirements of the semiconductor industry and addresses the unique safety issues that acetylene presents.

“Due to the instability of acetylene, a porous mass and a solvent (typically acetone) are within the cylinder package. As gas is drawn from the cylinder, acetone is in the acetylene stream. Acetone concentration increases as the volume of acetylene in the cylinder decreases. Eventually,” Maykut explained, “acetone concentration reaches a point that affects the process.”

He said the Air Products acetylene delivery system solves the problem by (See Fig. 1):

- Reducing acetone concentration as cylinder temperature is reduced.
- Maintaining acetone concentrations below two percent by chilling alone.
- Maintaining acetone concentrations below 10 ppm with a purifier.
- Delivering consistently low acetone concentrations across the entire cylinder volume.

Key customer benefits of the system, Maykut noted, include increased cylinder utilization to as much as 90 percent, reduced operating costs, improved film quality, and better yields.

The bottom line according to Maykut?

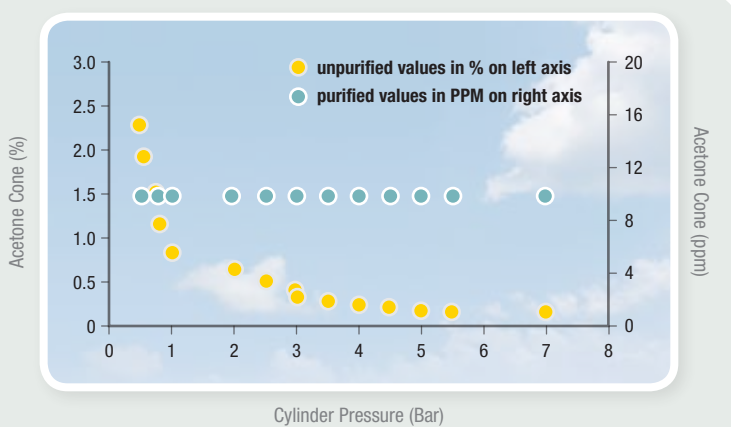
“A safe, low-cost solution combining some familiar equipment in a unique way to consistently provide quality and virtually acetone-free acetylene for the CHM process.”

For more details, refer to Maykut’s acetylene delivery system podcasts at our e-learning center [www.airproducts.com/markets/electronics/elearning\\_center/index.asp](http://www.airproducts.com/markets/electronics/elearning_center/index.asp).

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\*Results at -20°C with purifier.  
Cylinder temperature = -20°C.  
Instrument LDL = 10 ppm

Acetone vs. Cylinder Pressure\*



The Air Products system meets both the process requirements of the semiconductor industry and addresses the unique safety issues that acetylene presents.

## APHYT and Korea University of Technology and Education Partner to Develop Future Technology Leaders



APHYT program students include, from left, back row: Baek Jong-Yeon, Shin Dong-Min, Jung Kwang-Woon, and Cho Yeong-Saeng; and, front row, Lee Sung-Yong and Park Hong-Kyun.

Air Products HYT (APHYT)—our local specialty gas/chemical source/delivery equipment manufacturing business for Electronics and Equipment Solutions [EES] in Korea—is partnering with Korea University of Technology and Education to develop future technology leaders.

During January and February, Park Hong-Kin, a third year mechanical engineering student and four other undergraduate students—Baek Jong-Yeon, Lee Sung-Yong, Cho Yeong-Saeng and Jung Kwang-Woon—worked shoulder-to-shoulder with APHYT/EES in Korea to develop an understanding of gas and chemical equipment manufacturing.

The program is designed to introduce the students to semiconductor and PV equipment, as well as develop next generation technology and train future manufacturing leaders. The E2-Semiconductor Equipment Human Resource Development Center (HRD) at the University of Technology and Education Center in Korea supports it. APHYT is a center member.

While providing the students with valuable learning experiences, the program also helps APHYT address short-term resource issues as the economy recovers and our gas and chemical equipment business rebounds.

It is an excellent opportunity to promote and cultivate young enthusiastic leaders who will drive future development of the semiconductor equipment business and help us navigate through the next generation of technology advancements.

Shin Dong-Min, director of Industry-University Cooperation and former Hynix Semiconductor System Infra Technology team senior manager planned the program.

“Participating students have told us that they have learned to recognize the requirements of various customers and how industry leaders, such as Air Products and APHYT, respond to such needs”.

With 150 students, 23 corporations, three R&D facilities, and seven associations participating in 2010, the program at APHYT goes beyond gas and chemical equipment manufacturing technology—it also introduces students to many other business areas and opportunities available at Air Products.

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## Air Products Taps into Emerging PV Market in India

To capture the enormous market potential, Air Products participated in the SOLARCON India exhibition with its joint venture, INOX Air Products Ltd. The company’s SunSource™ Solutions for the photovoltaic (PV) industry attracted attention during this three-day exhibition, which was the biggest solar show in the country and had around 3,000 industry visitors.

Air Products’ SunSource Solutions was the key theme during the show and well answered the call on grid parity and fast ramp-up from the PV industry. Air Products’ global leadership and experiences in PV manufacturing helped the company win many contracts from both thin-film and crystalline photovoltaic manufacturing, including the recent new gases and materials contracts with two leading PV manufacturers in India.

India is on the threshold of rapid growth in photovoltaic adoption and manufacturing. Thanks to the recent government initiatives to aggressively promote solar power and the announcement of a plan to scale up solar power generation to 20GW by 2020, there will be huge demand for domestic solar products, including solar cells that will require large volumes of gases and related services in India.

The exhibition also provided a good opportunity to meet and network with existing and prospective customers in India, and share how Air Products can bring its global experiences to their PV manufacturing operations in the local market. Particularly, how INOX Air Products’ capabilities are meeting the gases demand of the market with established infrastructure and engineering resources in India.

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Air Products participated in SOLARCON India on November 9-11, 2009 with its joint venture, INOX Air Products Ltd.



## Win an iPod Shuffle!

Provide Your Feedback and Possibly Win an iPod Shuffle

If you would, please take a moment to answer our brief survey, we’d really appreciate it. One of our completed survey responders will be receiving an iPod Shuffle (the winner will be drawn at random from the finalized surveys)

<http://www.zoomerang.com/Survey/WEB22AMXMS7WJT>

# Dallas Forum Covers Dicing Challenges



Giorgio Technology Sales/Service (GTS), Mesa, Ariz., and Air Products teamed up to present an “All Things Dicing” forum on the challenges of dicing, including surfactants, blades, tapes, and pumps, at our Irving, Texas offices.

GTS is the sole sales and services provider for legacy DISCO dicing machines in the U.S, and is an influential player in the dicing arena in North America. GTS is also the U.S distributor for Air Products’ BPS-729/B dicing products.

Four other major dicing services, equipment and consumables providers participated, each of them experts in their field, with a combined experience of more than 100 years of dicing!

Larry Stogner of MPE (Micro Precision Equipment/Engineering) Inc. Greenville, Texas, led the forum, bringing his vast experience and valuable insights on all things dicing from a user’s perspective, reported Raj Ramamurthi, Air Products’ manager of BPS chemistries.

MPE is the US sales representative for Loadpoint, a UK-based dicing OEM. MPE, and GTS were instrumental in helping develop the BPS dicing product line through field-testing and validation.

Rob Giorgio, owner of GTS, discussed the importance of the right tape for the job; different types of tape and their uses; back side chipping; tape alternatives pros and cons.

Tom Van Eaton, ABN Surfactant Delivery Systems, an outside sales agent of GTS, based in Eatonville, Wash., reviewed available surfactant and delivery systems.

Mario Robles, U.S. representative of ASAHI/America based in Hawaii, reviewed blade construction and using the right blade for the job; abrasives used in blades and what they cut; the importance of the right abrasive concentration; and reducing chipping and cracking.

Finally, Ramamurthi provided detail on Air Products’ new line of dicing surfactants (BPS-729 and BPS-729-B) for keeping the machine and substrate clean; reducing chipping and cracking, and eliminating E.S.D. He touched on the unique value proposition that BPS products bring to the dicing application—the prevention and removal of metal oxides off substrates to improve bondability and reliability.



Air Products’ “All Things Dicing” forum at Irving, Texas, drew many participants.

The forum, which was second in a series of events planned for the year was timed with the launch of [allthingsdicing.com](http://allthingsdicing.com), an online portal for dicing-related discussions being hosted by GTS.

Both events were extremely well received by the audience that comprised technicians, engineers, managers, and heads of small dicing companies. The Santa Clara event in January attracted 34 attendees from about 15 companies, while five companies attended the Dallas forum, held at a smaller venue.

Ramamurthi said the informal nature of both events ensured free flow of information that was invaluable not just to the audience but to the organizers as well.

As one of the attendees remarked, “there’s so much technical know-how that is there to be exchanged, and this sort of a forum is exactly what we need for dicing, but is sadly missing. I’m happy Air Products have taken the initiative to host this event”.

Ramamurthi stressed the importance of being “technology agnostic” in not attaching exclusively to any one OEM, and the need to educate the customer so that they could make smarter choices. “Our online portal further drives home this point,” added Giorgio.

BPS (Better Process Solutions) products are aqueous or solvent-based solutions that are made for cleaning applications in electronics test, assembly, and packaging.

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## TSMC Honors Air Products with Fifth Supplier Award Since 2002

The Taiwan Semiconductor Manufacturing Company Limited (TSMC), the largest semiconductor foundry in the world, presented its “Supplier Excellence Award” to Air Products in recognition of its excellent performance in gases and chemicals.

The Supplier of the Year Award, which has eight distinct categories, surveys and ranks more than 300 suppliers in the areas of quality, cost, delivery, service, technology, and safety provided to TSMC. The 2009 award marks the fifth time in the last eight years that Air Products has won, and it

is the first time the company has been recognized in both the gases and chemicals categories in the same year.

The award was presented during TSMC’s 2009 Supply Chain Management Forum held in December 2009 and attended by more than 350 representatives from the world’s leading suppliers in the semiconductor manufacturing industry.

Air Products, through its subsidiary in Taiwan, Air Products San Fu, supplies all TSMC’s fabs at the Hsinchu and Tainan Science Parks, as well as other TSMC locations, with bulk and cylinder elec-

tronic specialty gases, MEGASYS® services, and GASGUARD® gas cabinets.

TSMC created the semiconductor dedicated foundry industry when it was founded in 1987. It continues as the market leader by posting annual sales of US\$9.83 billion in 2007 and currently employs more than 20,000 people worldwide.

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In a recent ER drill in Taiwan Hsinchu, Air Product's ER team moved the leaking chlorine cylinder into an ERCV under water spray, which was used to trap chlorine vapors and stop leakage to the environment.

## Air Products San Fu Demonstrates its Commitment and Capability to Emergency Response in Taiwan

Air Products San Fu in Taiwan, demonstrated its commitment to Emergency Response (ER) together with the Taiwan Council of Labor Affairs and the Taiwan High Pressure Gas Industrial Association.

More than 100 people, including government agencies, customers, and representatives of the electronics industry, participated in this event, which was held in Hsinchu, Taiwan

"This is my first experience seeing this kind of ER demonstration. I learned a lot about Air Products' ability in handling emergency situations, and I am even more confident in the company," said Mr. Lu, from AU Atonics Corporation, one of our TFT-LCD customers.

The Air Product's ER team conducted both in-class trainings and hands-on ER drills during this event. Using hypothetical scenarios, the team showed how to handle leaking chlorine cylinders and leaking silane under different sizes of Restricted Flow Orifice (RFO) and without RFO in the physical drill. They also demonstrated our ER equipment.

Kelvin Huang, senior manager, Air Products' Packaged Gases Operations Asia said, "The regular ER drills demonstrate our commitment to safety, strengthen our relationship with government authorities, as well as gain hands-on experience in handling emergencies."

In addition to conducting drills regularly, Air Products San Fu also supplies ER equipment, such as emergency response container vessels (ERCV), to local associations and government agencies. A recent example to use the ERCV was the ER drill conducted by Taiwan High Speed Rail Corporation, the fastest mass transportation system connecting the north and south of Taiwan.

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## Carlsbad Hosts San Diego Science Alliance BeWise Students

By Carolyn Neilson  
Marketing Communications, Carlsbad

Recently, the Carlsbad facility hosted a tour of our clean rooms and analytical labs for students from the San Diego Science Alliance BeWise (Better Education for Women in Science and Engineering) Program.

The San Diego Science Alliance BeWise Program encourages talented young middle and high school aged girls to pursue science and engineering professions. The events are designed to give the female students an opportunity to practice hands-on in a scientific setting, in the hopes that they will continue their science educations with a goal of working in a related field upon graduation from college.

Before we got started, we gave the students an overview on what semiconductors do and just how many devices they run (basically, everything electronic). They opened their eyes wide when they found out that semiconductors are used in their iPods and cell phones (very important tools to teens their age).

After the overview, the students got a glimpse of what it is like to work in a clean room. The first step was to "gown up" in our disposable clean room suits (it was then that the students fully understood why they call them "bunny suits"). Once properly gowned, the students entered the clean room and were able to do some hands-on experiments with our analytical equipment. These experiments were designed by our Carlsbad chemists to be interactive and allow the students learn from our chemists in a true clean room setting.

At the end of the morning, the students met in small groups with the Air Products employees participating in the event. They had an opportunity to ask whatever questions they had about working in a science-related field. During the event, we stressed the importance of continued education.

One of the girls stated that she really liked the hands-on experiments, and working with the chemical solutions. Another student stated that she liked being able to get gowned up, and that the clean room was "way more high-tech than she would have ever imagined."

They all got to leave with their clean room suit—I think I know what 9 kids are going to be this coming Halloween!

The employees at the Carlsbad facility involved in this event were: Matt Jahl, Celso DeOliveira, Christina DeMaria, Tingfung Kok, Katie Savage, Eileen Turner and Carolyn Neilson.

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A BeWise student evaluates samples.



The San Diego Science Alliance BeWise students all gowned up and ready to learn.

## 2010 Golden Gas Award Goes to GASGUARD® Direct Blender

Gases and Instrumentation International Magazine presented a 2010 Golden Gas Award to Air Products' GASGUARD® Direct Blender (Dynamic Onsite Gas Blender).

This year's competition attracted more than 43 entries in eight categories. Each product was rated on five criteria—ability to solve an important challenge to the gas industry; technological innovativeness; environmental “green” attributes; superior specifications in terms of power requirements, speed, footprint, maintenance; cost effectiveness, and other quality considerations. The GASGUARD Direct Blender won in the On-Site Gas Generation/Recycle/Recovery category.

According to GASGUARD Product Manager David Eshelman, the PV, IC, and flat-panel industries all require large volumes of expensive and hazardous dopants such as phosphine for the epitaxial layer. Usually the dopants are mixed at ratios of 0.5 to 5 percent in hydrogen or nitrogen, depending on the process. As production ramps and gas flow rates increase, the volume of mixed gas cylinders required becomes a challenge due to container transportation, handling and shelf life, space requirements, and inventory costs.

Said Eshelman, “In an attempt to reduce these costs and inventory risks for our customers, we have leveraged our own mixed gas production experience to create an on-site gas blender designed to dynamically blend the mix at concentration tolerance levels equivalent to our own production facilities, but onsite at our customer's facilities. The system is derived from real world, production experience and is a smaller scale replica of Air Products' own

dynamic blend production plant located in Chonan, Korea.”

Eshelman said the blender is very efficient. “A standard pure dopant gas cylinder is contained within the blender module. This source container feeds gas into the mixing panel which blends with on-site hydrogen or on-site nitrogen to the pre-defined mix ratios. The integral analytical system validates and dynamically adjusts the blend concentration, real-time to maintain accuracy.

“The mixed gases are then stored in the adjacent surge or day tank. Since the quality of the mix is equivalent to Air Products' own production facilities, there is little risk in process impacts with mix quality or shelf life. Any variations in mix quality are quickly recognized by the real-time dynamic blending system before any impact to the production facility.”

Given current market prices for many of dopants, Eshelman continued, once the production facility is running near capacity, economics show a potential payback of two years or less.

With the right mix, cylinder handling, shipping, and inventory can be reduced by up to 95 percent. Designed to be configurable for applications in multiple industrial settings, including IC and PV, the blender can be a key feature in reducing production costs.

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## Upside in a Downturn: New Products Paying Off (cont. from page 1)



*Air Products' experience in molecule design, synthesis, and application support, as well as close partnerships with key OEM's, enable us to meet customer-specific performance and cost targets.*

reduce their capital expenditure by hundreds of millions of dollars, and achieve the capability to “shrink” their devices. Again, this is an extraordinary material science development in Air Products Electronics technology. We've also deployed our material technology focus beyond semiconductors.

We have developed specialty electronic polymeric materials, such as our Flexthane® suite of products, for use in display modules for electronic readers like Amazon® Kindle™, Sony Reader™ and the Barnes & Noble Nook™.

Our success in this area is based on our own tried and true methodology that gives us a competitive advantage. We became deeply involved with this

new application, leveraged our polymer dispersion capability, and produced, characterized, and delivered consistent, high-value materials that work for our customers.

Another new product from Air Products is our XeCover™ Xenon Recovery System, which is commercialized and operating. Since xenon is a very expensive and therefore valuable material, we have created equipment that recovers it directly from the effluent of our customers' processes.

Again, we leverage our customer involvement instincts, and combine that with our material adsorption and VSA (vacuum swing adsorption) technology. We can design a system that can tolerate a variety of effluent streams and xenon concentrations. If xenon is in there, we can recover it and save our customers money in doing so.

The XeCover system gives us access to numerous market segments including lighting, MEMS (Micro-Electro-Mechanical Systems), lasers, and semiconductors. The XeCover system also has facilitated our advance into other, new material science opportunities.

Our access to cheaper xenon and our long history of fluorine expertise make us the natural producer of xenon difluoride (XeF<sub>2</sub>), a highly selective, high-performing etching material. We currently have many samples of our material being used by

prospective customers. The first application will be for MEMS, but there are many exciting applications and we are leveraging our deposition and etching knowledge to explore them.

Finally, our Surface Preparation and Cleaning platform continues to make good progress in our base semiconductor business. We have early adoption success of our ACT® 915A stripper and we are gaining momentum in our CP88D cleans formulation.

Also exciting are the numerous emerging applications for our overall capability. Our knowledge of formulation, surfactants, particle / surface cleaning combined with our applications knowledge is being deployed to photovoltaics, wafer dicing, and backend packaging applications.

The common theme, current and future customers need material science to solve the new challenges they are encountering. Although the challenges are new, the Air Products playbook is the same—great people and technology deployed to customers to help them solve their emerging challenges. We have used the downturn of 2009 to accelerate these growth opportunities and we are ready to support our customers.

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## SunSource™ Solutions Website Revamped

Our SunSource Solutions™ for PV Manufacturing website has been revamped to provide an even more user-friendly overview of the products and services we offer to five specific PV markets—thin film, polysilicon, wafering/ingots, crystalline, and III/V solar cells.

The thin-film market is broken down further into three sub segments, including amorphous silicon/micro-crystalline silicon (aSi), copper indium gallium (CIGS) and copper indium diselenide (CIS), and cadmium telluride (CdTe).

For each market and sub segment, we have listed the product name, a description, and quick links to the appropriate data and MSDS sheets.

“We believe this change, based on customer feedback and our rapidly growing involvement with PV manufacturing, will make it very easy for electronics customers to see exactly what Air Products offers for each PV manufacturing process—from a single bulk gas to total turnkey project execution,” said Dave Tavianini, North America PV Business/Global marketing manager.

For example, the product list for the thin-film market includes argon, fluorine, helium, hydrogen, nitrogen,  $\text{NF}_3$ , oxygen, and silane; the

ChemGuard® chemical liquid delivery system; dopant mixes ( $\text{POCl}_3$ ,  $\text{B}_2\text{H}_6/\text{H}_2$ , etc.); the GASGUARD® direct blender; GASGUARD gas cabinets; MEGASYS® on-site services; and turnkey project execution.

“It makes it very easy for customers to see what we can offer them as a sole-source gases and equipment supplier to help provide lower cost of ownership and faster facility ramp-up,” said Tavianini.

Visit our new “SunSource Solutions for PV Manufacturing... from Construction, to Production, to Expansion” at [www.airproducts.com/sunsource](http://www.airproducts.com/sunsource).

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## Helios Purchases ChemGuard® CG1000 $\text{POCl}_3$ Refill System

Italy's Helios Technology S.p.A., part of the Kerself Group, has purchased an Air Products ChemGuard® CG1000 Automated Chemical Delivery System, developed exclusively for the PV market to help customers towards their goal of achieving grid parity.

The system includes the CG1000 bubbler, VMB (valve manifold box) and 12 SCMs (source controller module), which have been installed at Helios' new PV cell manufacturing fab between Milan and Venice.

“The latest successful installation at Helios integrates the CG1000 system into a third OEM toolset (Centrotherm) and fourth high-volume PV manufacturer,” said Gil Vivanco, CG1000 new product manager. Helios, acquired by Kerself in 2006, has been a major producer of PV cells and modules since 1981.

Vivanco said the contract is an important win for the company in Europe. He credited Field Service in Carlsbad, Calif., and Italy; New Products Development in Carlsbad and Allentown, Pa.; commercial support in Italy and Carlsbad; and Semiconductor Equipment Manufacturing (SEMC) in Allentown.

Air Products' Electronics Equipment Solutions (EES) designed the state-of-the-art bulk chemical delivery system for crystalline silicon PV manufacturing. It is designed to reduce dopant bubbler refill costs by more than 45 percent and enables customers to minimize their cost of operation and risk of contamination, while improving delivery system safety and reliability.

Tested for two years, the CG1000 is a significant technological breakthrough for the improved safe handling of  $\text{POCl}_3$ . Alpha test results produced conclusive analytical data showing that no toxic levels of chemical residue remain in the bulk container connections. This key milestone facilitated the product launch into beta testing where chemical container exchanges could be made with no risk of exposure or contamination.

Katherine Hutchison, PV Offering Manager, commented, “The addition of the CG1000 system to our SunSource™ Solutions is just another example of how Air Products is working on ways to reduce the cost/watt to support the PV industry's drive to grid parity.”

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**tell me more**  
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### company information

Air Products serves customers in industrial, energy, technology and healthcare markets worldwide with a unique portfolio of atmospheric gases, process and specialty gases, performance materials, and equipment and services. The company has annual revenues of \$9 billion, operations in over 40 countries, and over 20,000 employees around the globe.

*Electronics Update* is published for the global electronics industry customers of Air Products and Chemicals, Inc. For more information, please call 610-481-2601 or Email us at [mckendej@airproducts.com](mailto:mckendej@airproducts.com).

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