



electronicsupdate

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LED Manufacturing Continues to Expand Dramatically

Ammonia, arsine, phosphine in high demand

Demand for Electronic Materials (EM) from global LED manufacturers continues to expand dramatically, particularly in Asia, with high double-digit growth projected through at least 2015, said Joe Stockunas, global business director for Air Products Electronic Materials.

“For us, demand for ammonia is especially strong. So is the need for arsine and phosphine to manufacture gallium nitride for high brightness (HB) LEDs. PCs, cell phones, and LED TVs are drivers. LED TV backlights are really driving growth now, but it looks like 80 percent of TVs now use LEDs, which means that market is well saturated. However, other devices are picking up the slack.



Air Products is positioned well to serve current and future demand for electronic materials (EM) for LED production.

“Once the incandescent bulb is taken off the shelves in 2014, for example, we’ll see very heavy demand for LED white lights,” said Stockunas.

Regardless of where the LED market goes, Air Products is well positioned to serve it with its comprehensive EM portfolio and other products.

“Ammonia is a significant EM offering. We have a leading position, the highest purity (99.99999 percent) in what we manufacture, and a completely integrated supply chain.

“Now, we have taken our ammonia capability a step further by building the world’s first ultra-purity on-site ammonia plants. The first two 2,000 metric ton per year plants are being built at Anhui Sanan OptoElectronics HB LED facility in China’s Wuhu Economic and Technological Development Area. This is a big step forward in high-volume ammonia supply,” said Stockunas.

Large volumes of ammonia are needed to provide the nitrogen source for the Gallium Nitride (GaN) layers used to make LEDs. Air Products currently supplies Sanan OptoElectronics’ two other China LED facilities.

(cont. on page 2)

Air Products Strengthens Commitment to Silane

Air Products, which has more than 30 years of experience in the safe, reliable supply of cost-competitive silane to the electronics industry, has strengthened its commitment to the product by entering into a long-term supply agreement with Dow Corning.

John Cecchini, global product manager for silane, said under the agreement, Air Products will have access to silane volume to meet the long-term needs and growth of existing and new global Electronics customers.

Silane with a 99.9999 percent purity will come from Dow Corning’s new high-purity, state-of-the-art monosilane facility at Hemlock, Michigan, which is adjacent to Hemlock Semiconductor’s polysilicon plant. Cecchini said Dow Corning’s silane meets 6N specifications and SEMI standards equivalent to product available from other sources, which will enable customers to switch with confidence.

“Global customers will benefit from the combined strength of a large, established silicon manufacturer like Dow Corning, and the safety, expertise, and infrastructure capabilities of Air Products,” he said.

Cecchini said that Air Products has and continues to make significant investments in its silane supply chain, for example, ISO modules now number more than 100 and the company has several world-class silane storage facilities in key regions of the world. Air Products has also been qualified across all of its key silane market segments—IC, flat panel display, and PV.

(cont. on page 8)



Air Products’ Silane transfill facility in Hometown, Pennsylvania.

SEMICON Taiwan 2011 Draws 30,000 Visitors

The Asia Electronics team and Air Products San Fu, Air Products' Taiwanese subsidiary, recently participated in SEMICON Taiwan 2011 riding on the global themes of "Focused on What Matters Most" and SunSource™ Solutions. SEMICON Taiwan is a major electronics trade show in the region. This year it attracted 600 exhibiting companies and 30,000 visitors, surpassing the 2010 numbers.

The Air Products' booth was built with a large open area to facilitate interaction between our people and customers. Over the three-day exhibition, the Air Products team discussed business needs, challenges, and market trends with many customers and prospects.

Apart from posters and panels that illustrated offerings and expertise in semiconductor, PV, and TFT-LCD flat panel manufacturing, the Air Products' booth also featured ChemGuard® FACS, the chemical refill system for low-volatility chemicals. The equipment drew the attention of a lot of customers and visitors, and served as a good conversation starter.

Besides the capabilities of the Electronics team, the patented BIP® technology offered by the Packaged Gases team was one of the highlights in the Air Products' booth. The BIP cylinder gases ensure high purity and cost-effectiveness, which are important attributes to the manufacturing process of some customers in the electronics industry. The participation of the Packaged Gases team served to reinforce the integrated approach of the company.

"SEMICON Taiwan is an effective platform for us to show to the electronics industry our full capabilities in products and services, production facilities, safety, and technology," John Tsai, general manager of Electronics for Air Products Taiwan, commented, "and it also provides a good opportunity for the Electronics and Packaged Gases teams to meet face-to-face and build relationships with customers."

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EES Acquires PolyFlow Engineering

Air Products has acquired the business of PolyFlow Engineering LLC (PFE), a manufacturer of equipment for the semiconductor industry based in Albuquerque, N.M.

PFE has 100 employees and manufactures a line of equipment focused on advanced chemical delivery and precision cleaning for leading semiconductor manufacturers. It also offers equipment for the medical, optical fiber, and solar industries.

"The acquisition of PolyFlow Engineering is a good fit with our existing equipment business and should be immediately accretive to our bottom line," said Jae Woon You, general manager, Electronics Equipment Solutions (EES) for Air Products. "The combination of the talented and experienced PolyFlow team and Air Products' global capabilities and services infrastructure will bring long-term benefits to our customers."

Air Products has more than 60 years experience in the safe and reliable delivery of gases and chemicals to a variety of markets including the semiconductor, TFT-LCD, and PV industries.

EES is a business unit of the company's Electronics division. It offers its global customer base flexible, cost-effective, and contamination-free materials delivery solutions through products such as Chemguard®, GASGUARD®, and GasKeeper™ delivery systems, which are the industry benchmarks for safe and cost-effective chemical and gas delivery. Besides equipment, EES also sells onsite turnkey installation services.

EES operates from four major hubs including engineering and R&D at Air Products' headquarters in Allentown, Pa. and Carlsbad, Calif., and equipment manufacturing sites in Allentown and Ansan, Korea.

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PolyFlow Engineering's headquarters at Albuquerque.

LED Manufacturing Continues to Expand Dramatically (cont. from page 1)

Bob Ford, Air Products Bulk EM manager, said that 10 years ago Air Products anticipated the growth in LED manufacturing and the high volumes of ammonia it would require.

"Manufacturing and distributing white ammonia for LED production has become a core competency for us. Evolving from cylinders to heated ISO containers to Bulk Specialty Gas Systems (BSGS) to customer on-sites. We also created the purification process to manufacture seven 9s pure ammonia at our Hometown, Pa. and customer sites, as well as effective QC analysis," said Ford.

"Keeping pace with the demands of LED manufacturers by growing our ammonia and other capabilities has enabled us to serve numerous companies, such as major LED OEMs like Veeco, Somerset, N.J., and Aixtron, Aachen, Germany.

Currently, said Ford, Air Products is the only company providing ammonia at these volumes with the purity at the source for LED production.

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NF₃ Capacity Being Doubled at Ulsan

Air Products will more than double its NF₃ capacity at its Ulsan, Korea production facility. The new capacity is expected to be on-stream in the second half of 2012.

NF₃ remains the chamber cleaning gas of choice for semiconductor, thin-film transistor liquid crystal display (TFT-LCD), and thin-film photovoltaic manufacturers. Air Products pioneered the use of NF₃ as a chamber cleaning gas and has been safely manufacturing and distributing the product for more than 30 years.

"With the market for NF₃ tight and the major OEMs committed to NF₃ for their next generation processes, we felt the time was right to maximize our existing infrastructure and make this cost-effective expansion," said Wayne Mitchell, vice president and general manager of Electronics.

"We remain committed to the chamber cleaning business and plan on growing with our strategic customers and developing the products they need to produce the latest devices in consumer electronics."



NF₃ ISO modules at our Ulsan, Korea production facility ready to supply TFT-LCD customers.

Besides Ulsan, Air Products operates three independent NF₃ plants at its Electronic Specialty Materials (ESM) manufacturing facility at Hometown, Pa. The independent NF₃ facilities in the U.S. and Korea offer Air Products' customers significant security of supply.

With the capability to supply NF₃ or on-site fluorine, Air Products' portfolio of chamber cleaning solutions is unique in the industry. The company's products, chamber cleaning process experience, and history of fluorine production and handling provide semiconductor, PV, or LCD manufacturers with a variety of solutions for their applications.

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Stephen J. Jones Appointed China President in Shanghai



Air Products has appointed Stephen J. Jones as China president based in Shanghai to lead the company's next phase of strategic development in China. Jones, a member of the company's corporate executive committee, will retain his current role as senior vice president and general manager of Global Tonnage Gases, Equipment, and Energy.

"The appointment of Steve Jones as China president and his move to Shanghai is part of Air Products' corporate strategy to support our significant growth opportunities and accelerate our development in emerging markets," said John E. McGlade, chairman, president, and chief executive officer.

"China is a strategic market for Air Products. We have been investing in and serving this market for nearly 25 years and established strong positions

there. Having one of our corporate executive committee members based in Shanghai underpins our strong commitment to further growth in China."

Air Products has been operating in China since 1987 and was one of the first multinational industrial gas corporations to invest in the country. With more than 40 operating entities, 50 production facilities, and 2,200 employees, the company has already established a strong market position in China, serving a broad range of industries.

It also has established a number of regional capabilities in China, including an engineering center, a cryogenic manufacturing center, a technology center, and a strategic sourcing center.

Jones joined Air Products in 1992 and has since held various executive leadership positions in the commercial and legal organizations. Mr. Jones has served as senior vice president and general manager of Global Tonnage Gases, Equipment and Energy since 2009 and has been a member of the company's corporate executive committee since 2007 when he was named senior vice president, general counsel and secretary.

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Hydrochlor on Target for 2Q 2012 Start-Up

Air Products and Linde Gas North America announced that they are on track for a second quarter 2012 start-up of the high-purity anhydrous hydrogen chloride (HCl) processing and packaging facility the companies are building together in Freeport, Texas, as part of their Hydrochlor manufacturing joint venture.

The companies report that major milestones for the project are proceeding according to schedule, including detailed design, permitting, and procurement of long lead-time items. The companies estimate the operation will start up in late-April 2012, with product available in commercial quantities beginning in June. In the meantime, both continue to provide material produced by the Dow Chemical Company from their respective fill facilities to service customer needs.

Hydrochlor, a 50-50 joint venture, will sell HCl exclusively to Air Products and Linde Gas North America, who each will continue to market HCl independently.

"We are pleased to be progressing as planned toward commencement of supply from the new Hydrochlor facility," said Wayne Mitchell, vice president and general manager of Electronics for Air Products. "Customers in a variety of industries rely on domestic supply of this critical material, and our investment and participation in Hydrochlor will provide the much anticipated long-term solution."

"The design of this facility incorporates the experience and engineering strengths of both Linde and Air Products. It will be a true world-class, world-scale production facility," added Cliff Caldwell, vice president and general manager of Linde Electronics. "It incorporates our combined experiences of many years of handling anhydrous HCl to assure safe, reliable, consistently high-purity product to our customers."

HCl is a key raw material for cleaning reactors used in the epitaxial process and also for chamber cleaning. Much of North American merchant HCl is supplied to the pharmaceutical and agricultural industries. HCl also is used as a chemical intermediate in making inorganic chlorides.

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Hydrochlor

China University, Air Products Initiate R&D Project



Air Products has initiated a joint research and development project with the Sustainable Energy Laboratory of the China University of Geosciences Wuhan to accelerate the development of materials for the microelectronics industry.

By using computational modeling, the project will enable better understanding of the chemical mechanisms responsible for the deposition of thin films. The knowledge gained from such studies will help guide the selection of new chemical precursors that address a wide variety of needs for next generation logic and memory devices.

“Air Products has been cooperating with leading universities in China to accelerate the introduction of innovation to the marketplace. By leveraging the computational modeling capabilities of the China University of Geosciences, we are accelerating new product development to fulfill the requests we are receiving for electronics materials from our industry partners and customers in China and Asia,” said Ed Shober, director for Advanced Integration Materials at Air Products.

Air Products began a long-standing research collaboration program with the university in 2006. The two organizations have previously signed several R&D agreements and the collaboration has been highly successful in developing young talent, improving research facilities at the university, and enabling Air Products to accelerate the development of multiple advanced technologies and industrial gas applications.

In the past five years, several U.S. patents and patent applications were filed and a number of research articles were published in high-profile scientific journals as a result of this collaboration.

Professor Yanxin Wang, president of China University of Geosciences, said, “We are delighted to form partnerships with leading international technology companies like Air Products. Our collaborations in the past five years have proven to be extremely fruitful. Our faculty members and students have benefited by gaining global industrial perspectives. I am confident that the newly initiated projects will be successfully executed. We look forward to further strengthening our relationship with Air Products.”

Professor Zhenyu Bao, dean of School of Chemistry and Materials Sciences of the university said he is also pleased with the partnership. “Air Products is recognized as a highly innovative global industrial gases and performance



The Solar Energy Laboratory at the China University of Geosciences Wuhan.

materials company. The collaboration will facilitate technology transfer from academic research to industrial gas applications. We are very excited about this partnership.”

Air Products was the first global industrial gas company to establish an internal R&D capability in China when it set up its Asia Technology Center in 2005. That center today serves high-growth market segments in China and the rest of Asia, including performance materials, electronics, and merchant industries.

Established in January 2010, the Sustainable Energy Laboratory (SEL) of the China University of Geosciences is a platform with a strong emphasis on materials R&D related to renewable energies and energy efficiencies.

The organization was co-founded from the former Institute of Theoretical Chemistry and Computational Materials Science and by faculty members engaged in energy-related research. Since its inception, the SEL has established itself as a center of excellence in research on hydrogen storage, fuel cell catalysis, and molecular and materials simulations, design, and synthesis.

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Nitrogen Capacity Expanding at Gumi



At the Gumi National Industrial Complex, North Gyeongsang Province, Korea, Air Products will increase production of gaseous nitrogen and expand its nitrogen pipeline to serve the increasing demand of its electronics customers in the country's largest inland industrial complex.

Air Products will build a new nitrogen plant at its site in the Gumi National Industrial Complex 2 and will expand its nitrogen pipeline serving Complex 5. The pipeline currently delivers nitrogen to nearly 20 long-term PV and semiconductor customers across Complexes 1 to 4.

The new plant is expected to be on-stream in the summer of 2012 and will serve the increasing needs of existing customers, as well as new demand in Complex 5.

Gumi serves as a hub of local development and transportation. The Gumi National Industrial Complex has been established as a center for industries including electronics and semiconductors.

Major products are mainly high-tech electronics, displays, telecommunication equipment, and emerging PV devices. Air Products' Gumi customers include major semiconductor and PV manufacturers.

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XeF₂ is a key product for etching applications in MEMS manufacturing.

Xenon Difluoride (XeF₂) Vital to MEMS Market

Air Products supplies a range of gases and chemicals for etching applications in MEMS manufacturing processes. Our solutions include delivery systems that will help lower your costs, ensure supply quality and reliability, and improve safety.

Our MEMS portfolio includes the etching gas, xenon difluoride (XeF₂), which provides manufacturers with a high selectivity to silicon versus SiO₂ and other materials.

Air Products is uniquely positioned to serve the burgeoning XeF₂ market with its more than 35-year history of fluorine expertise and its access to affordable xenon due to its large-scale air separation units and XeCovary™ xenon recovery system (www.airproducts.com/xecovary).

“Our offerings are complementary and together offer customers a stable low-cost supply of XeF₂,” said Tim Frassinelli, global product manager for Air Products. “Our experience in chemical synthesis has shown that the continuous, flow-through process we developed can deliver quality material at the high volumes needed to match the growth potential of the MEMS market.

“Our deep understanding of etching process applications and supply of other etch materials provides further value to any XeF₂ user. Also, our packaging and delivery expertise support an easy integration of this material to customers’ equipment.”

Air Products has fully commercialized the product and is supplying many MEMS customers throughout the world.

To hear more about the XeF₂ market and its use in the MEMS industry and elsewhere, listen to our website xenon difluoride podcast. For more information on XeF₂ and other etching products for the MEMS market (CF₄, CH₂F₂, C₂F₆, C₄F₈, C₅F₈, CHF₃ and xenon) visit www.airproducts.com/industries/Semiconductors/MEMS.aspx.

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Air Products Top-Level Sponsor of ALD 2011

Air Products was one of the top-level sponsors of the 12th International Conference on Atomic Layer Deposition (ALD 2011) held at the end of June in Boston.

This year the annual conference attracted more than 300 researchers from the world’s top industrial electronic companies and universities. They were able to share ideas on this relatively new deposition technology, which is doing much to further miniaturization microelectronic devices. ALD enables deposition of the extremely thin and highly conformal films already found in the latest DRAM and Flash memory devices, using extremely selective surface chemistry.

Scientists from Air Products Electronics R&D centers in the U.S. and South Korea presented one oral and two poster papers on the development of new precursors for ALD of high-K dielectric films and silicon oxide films. (See Technical Papers in this issue.)

The team introduced novel strontium and barium precursors with enhanced deposition rates for potential application in next generation memory devices. They also presented the results of depo-

sition and modeling studies to explain the benefits of Air Products commercial precursors for deposition of high-quality and high-deposition rate silicon oxide films.

Presentations were well received and stimulated discussions with both existing and potential customers for the company’s products. Customers were able to meet with Air Products commercial and technology teams in a private suite to exchange ideas concerning this fast-growing field.

As a result of these meetings, several companies requested precursor samples and proceeded with internal evaluation of the new Air Products’ materials. The conference also provided important insights into current industry needs and also into new exciting developments in academic and industrial labs.

The conference is an annual event and Air Products will be represented again when ALD 2012 is held at Dresden, Germany, from June 18 to 20, 2012.

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POCl₃ Safe-Handling Videos Help Customers

Air Products has been a long-time supplier of POCl₃ (phosphorous oxychloride) for semiconductor and flat panel manufacturing. We continue to work closely with our POCl₃ customers to make sure that they understand the safety needs around its usage and the quartz bubbler in which the chemical is delivered.

As you know, our commitment to safety, health and the environment is unwavering. Since customers are using higher volumes of POCl₃, especially for crystalline PV solar cell manufacturing, and there are more people who are working with the chemical for the first time, Air Products has produced a series of six safe handling videos.

Working with Carolyn Neilson, Air Products marketing communications, the company’s Carlsbad, California and Catoosa, Oklahoma teams developed videos covering these topics:

- What is POCl₃?
- Unpacking of the POCl₃ bubbler.
- Functions of the valves on the POCl₃ quartz bubbler.
- Overview of the bubbler removal from the tool.
- Installation on the tool.
- Repacking the bubbler for safe return shipment to Air Products.

Each video includes an overview of proper Personal Protective Equipment (PPE) and provides a number to call if the customer has any questions or concerns prior to handling the product.

The series is available at www.airproducts.com/pocl.

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The Air Products POCl₃ bubbler.

Banwol Now On-line

Air Products' new electronic materials facility in Banwol, Korea is on-line. The newly commercialized materials produced at this facility support semiconductor manufacturers in creating advanced generation devices.

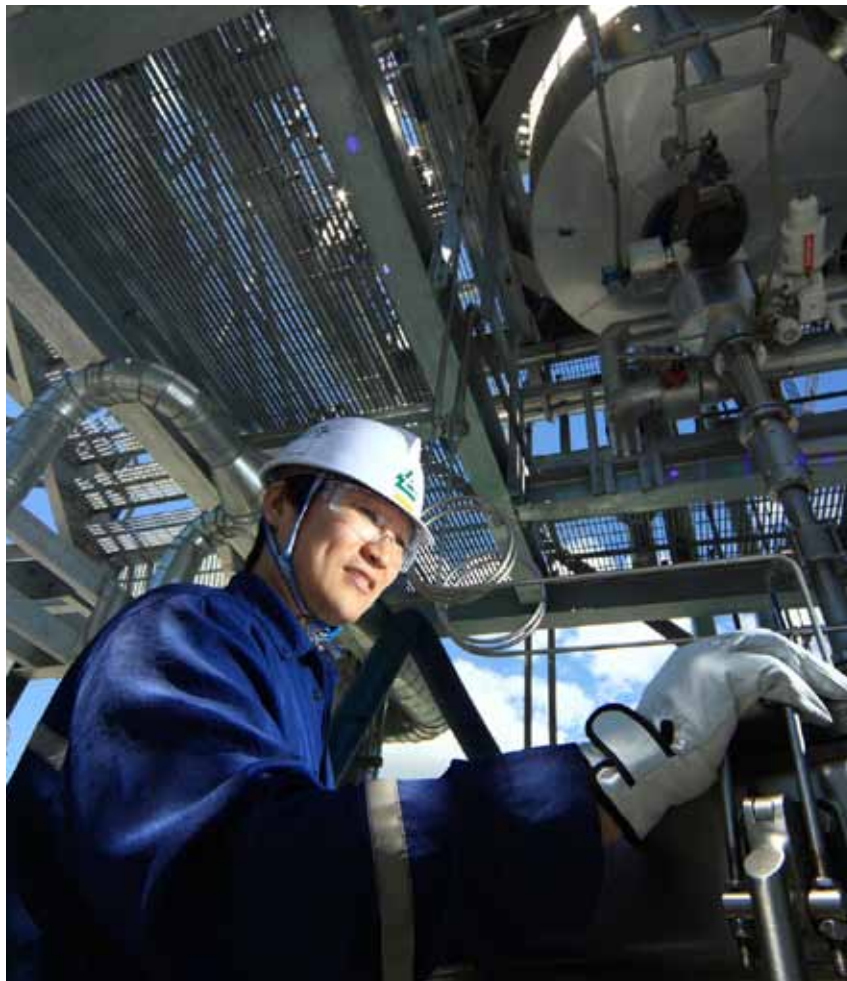
As device geometries continue to shrink in size, there are increasing needs for new dielectric materials to address process needs such as lower thermal budget and filling of nanometer-scale features. The Banwol facility enables flexible manufacturing of a wide variety of new dielectric products.

New materials being produced at Banwol include the AP-LTO[®] and AP-LTN[®] product lines, which enable deposition of silicon nitride and oxide films by Atomic Layer Deposition, Plasma Enhanced Atomic Layer Deposition, and Chemical Vapor Deposition for a variety of emerging applications—spacers, sacrificial films, protection layers, etch stops and diffusion barriers reported John Langan, director of technology, Electronics for Air Products.

The materials manufactured at Banwol are being incorporated into devices like NAND Flash memory for portable electronics, DRAM to boost computer operating systems, advanced logic applications, and telecom applications like smart phones. In many cases, Air Products' new materials are developed and tested for performance with, and supplied to, industry-leading tool suppliers and semiconductor manufacturers.

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New electronic materials being produced at Banwol include the AP-LTO[®] and AP-LTN[®] product lines.



De-Ling Zhou, Ph.D., COO of ENN Solar Energy; Dr. Liyou Yang, president and CEO of Astronergy; and Air Products' John McGlade (from left), flip the switch to dedicate Air Products the corporate headquarters solar farm.

Air Products Flips Switch on its New 2MW Solar Farm

At a recent ceremony at its corporate headquarters, John McGlade, Air Products' chairman, president, and CEO, flipped the switch on the company's new 2MW solar farm comprised of more than 11,000 silicon thin-film panels supplied by two of its customers and one that is capable of supplying enough energy to power more than half of Air Products' administration buildings.

"It is really special to be able to demonstrate our customers' products and begin generating clean, renewable energy for our campus. It is a great opportunity for employees, our community, and our customers to witness first-hand how our innovative products deliver sustainable solutions for PV customers," said McGlade.

The installation, built with panels supplied by Air Products' customers, Astronergy and ENN Solar, is one of the largest silicon thin-film projects in the U.S. Both Astronergy and ENN Solar use Air Products' SunSource[™] Solutions—a complete portfolio of gases and materials, equipment, and services—to manufacture their silicon thin-film panels.

The 15-acre installation is capable of generating 2MW of renewable power, which will help Air Products reduce its dependence on purchased electricity and lower its CO₂ emissions by approximately 2,000 tons per year.

Silicon thin-film PV panels, which convert sunlight directly into electricity, are manufactured in much the same way as thin-film transistor-liquid crystal displays (TFT-LCD). As one of the leading suppliers to the TFT-LCD industry, Air Products is ideally suited to supply silicon thin-film manufacturers.

The company's expertise in supporting the broader Electronics industry makes it an excellent choice in supplying materials to other major PV technologies such as crystalline silicon, CdTe, CIGS, and III-V compound cells as well.

The solar farm was made possible through investment by Air Products and a grant from Pennsylvania.

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On-Site Fluorine Lowers Chamber Cleaning Costs

With the capability to supply both NF_3 and on-site fluorine, Air Products' portfolio of chamber cleaning solutions is unique in the industry.

The company's products, chamber cleaning process experience, and history of fluorine production and handling provide semiconductor, PV, or LCD manufacturers not only with a variety of solutions for their applications, but also opportunities to lower costs, said NF_3 and fluorine product manager Tim Maykut.

"Only on-site fluorine generation (minimum of 150 metric tons/year) can offer a step change reduction in chamber cleaning costs," said Maykut. "If you are using 500 metric tons a year of NF_3 , for example, at current prices, you could save approximately \$3 million a year using on-site F_2 . If you use 2,000 metric tons of NF_3 , you could save as much as \$24 million per year with on-site fluorine.

"That is a 30 and 50 percent reduction respectively in the equivalent price of NF_3 annually, which is obviously a significant saving," said Maykut.

Additionally, fluorine offers environmental benefits as it significantly reduces green house gas emissions associated with the chamber cleaning application. Dedicated on-site F_2 generation also reduces exposure to NF_3 market limitations, volatility, and logistic challenges and to ensure maximum reliability of chamber cleaning gas supply.

"Air Products will own, operate and maintain on-site customer fluorine plants that have a 98 percent uptime record and backs them up with bulk gas (BSGS) NF_3 supply. That translates to 100 percent reliability," said Maykut.



Air Products' portfolio of chamber cleaning solutions, including on-site fluorine, is unique in the industry.

The company currently operates five fluorine plants—three at its Hometown, Pa., electronic materials facility and two in Japan and has an extended history of operating multiple large-scale F_2 manufacturing plants safely for more than 30 years.

"Safety is the first priority for everything we manufacture, especially fluorine, which is an extremely reactive element. We welcome the opportunity to show customers how on-site fluorine can safely lower chamber cleaning costs."

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Air Products Signs Second Contract with Samsung Mobile Display



Samsung Mobile Display (SMD) awarded Air Products a second contract to supply gaseous nitrogen and oxygen, and liquid argon.

Air Products has been selected to supply gaseous nitrogen and oxygen, and liquid argon to Samsung Mobile Display (SMD) for its Active Matrix Organic Light Emitting Diode (AMOLED) production.

This is the second contract of its type following last year's contract for SMD's 5.5 generation AMOLED.

Air Products will build another air separation unit and pipeline at its Tanjeong, Korea site for gases to supply to SMD's upcoming fab. Air Products also

will build purification, filtering, and monitoring systems. The company is currently supplying gaseous nitrogen and oxygen, and liquid argon to SMD's existing AMOLED fab in Tanjeong and two large-scale TFT-LCD facilities in Cheonan.

"Samsung has been a long-standing and strategic customer for Air Products. We are honored to have their continued confidence in our capabilities to support their growth," said Wayne Mitchell, vice president and general manager of the Electronics Division. "This contract once again demonstrates our capability to serve the world's largest electronics customers with our infrastructure, technology advancements and product capacity in place."

Besides Tanjeong and Cheonan, Air Products also recently announced nitrogen and pipeline expansions in many of the most important semiconductor and LCD manufacturing geographies around the world including Gumi, Korea; Tainan and Tai Chung, Taiwan; and Austin, Tex. and Chandler, Ariz. in the U.S.

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TI Supplier Award



Texas Instruments (TI) has presented the 2010 Supplier Excellence Award to Air Products. The award, given annually, recognizes achievement in cost, environmental responsibility, technology, responsiveness, assurance of supply, and quality.

"Suppliers like Air Products help us to innovate, to provide more value. It's a collective effort on everyone's part—from quality folks to logistics—to get the product out on time," said Jeff Loewecke, procurement specialist for wafer fab materials, chemicals, and gases at TI. "The quality TI delivers depends on the support of Air Products, and we are proud of our 25-year relationship."

Air Products was the only industrial gas supplier honored in 2010 and has been supplying TI with gases, chemicals, and equipment for more than 25 years.

news of interest:

Company Stresses SunSource™ Solutions at PV Trade Shows

Air Products featured its SunSource™ Solutions offering for the PV market at this year's Intersolar North America Show at San Francisco in July and at the 26th European PV Solar Energy Conference and Exhibition at Hamburg, Germany in September.

Intersolar drew about 20,000 visitors from 80 countries and 834 solar exhibitors from 26 countries. ISNA is the premier solar event for North America.

EUPVSEC, considered to be PV's most important international conference of 2011, had more than 4,400 delegates from 84 nations, 41,000 visitors from 103 countries, and nearly 1,000 exhibitors from 37 countries. The top number of exhibiting companies were from China, Germany, and the U.S.

Both shows gave Air Products an opportunity to showcase its products and services for crystalline and thin film PV manufacturers and how it helps customers drive down cost-per-watt through innovative materials and product delivery solutions.

At both events, experts converged to discuss new concepts, trends, and developments in science and industry and benefit from inspiring platforms for dialogue and information exchange across the globe.

MORE INFO

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Hunan Province PV Maker Chooses Air Products Gases

Air Products has signed a contract with Hunan Gongchuang Photovoltaic Science & Technology Co., Ltd for the supply of bulk and specialty gases at its new silicon thin-film PV manufacturing facility in Hengyang City, Hunan Province, China.

The contract includes the supply of hydrogen and nitrogen, as well as silane, nitrogen trifluoride, dopant mixtures, and other products.

Hunan Gongchuang is building a 40MW facility (Fab 1200) incorporating Oerlikon Solar's Micromorph® turnkey production line. The new facility is expected to begin production by the end of this year.

"Air Products is pleased to be the primary gas supplier for Hunan Gongchuang's new thin-film PV facility," said Wayne Mitchell, vice president and general manager, Electronics, for Air Products. "We remain focused on helping our customers drive down their cost-per-watt through innovative materials and product delivery solutions."

Hunan Gongchuang's silicon thin-film PV modules will be manufactured in much the same way as thin-film transistor liquid crystal displays (TFT-LCD). As one of the leading suppliers to the TFT-LCD industry, Air Products is ideally suited to supply the new facility.

MORE INFO

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New Brochures Available

Air Products has produced two new brochures. One details the company's overall capabilities for Electronics customers; the second covers specific offerings for LED manufacturers.

You can download a copy of either brochure via Air Products' website:

www.airproducts.com/~media/Downloads/Brochure/brochure-materials-for-the-global-electronics-industry.ashx and www.airproducts.com/~media/Downloads/Brochure/brochure-materials-for-the-led-and-compound-semiconductor-industries.ashx.

MORE INFO

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TECHNICAL PAPERS:

"Impact of Surface Cleaning on Random Texturing of Crystalline Silicon Wafers" by A. Ebong, A. Upadhyaya, J. Kean, B. Rounsaville, I. B. Cooper, V. Upadhyaya, A. Kapoor, A. Rohatgi, D. C. Tamboli, A. Wu, and M. B. Rao, all Air Products. Extended abstract for the 26th European Photovoltaic and Solar Energy Conference, Hamburg, Germany, Sept. 2011.

"Post-CMP Cleaning of Copper Interconnects at Sub-30nm Technology Node" by D. Tamboli, G. Banerjee, and M. B. Rao, all Air Products. 16th International Symposium on Chemical-Mechanical Planarization, Lake Placid, New York, Aug. 2011.

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Air Products Strengthens Commitment to Silane (cont. from page 1)

"We are also well positioned to serve customers in all locations, including Asia where China has the highest demand for silane. The bottom line is that Air Products is totally prepared to meet short-term and long-term needs for silane throughout the world," said Cecchini.

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