

Polysilicon spot prices in China hit US\$20/kg

Polysilicon spot market prices in China surpassed US\$20/kg in April and are expected to climb higher in May, according to Taiwan-based market research firm, EnergyTrend.

Polysilicon spot prices had bottomed in January 2016 at just above US\$13/kg on overcapacity, notably due to US producers selling excess inventory, because access to the China market had been severely curtailed due to new import duties applied as part of the trade war with the US.

The hike in prices in China was attributed to tighter import controls and checks on polysilicon from overseas to ensure anti-dumping and countervailing duties were being applied properly. Market research firm IHS had already predicted that feed-in tariff (FiT) changes mid-year in China would drive polysilicon demand and price increases in April that could top US\$19/kg, up from US\$12/kg before Chinese New Year in February.

Karl Melkonyan, solar supply-chain analyst for IHS Technology, said: "Strong demand for polysilicon prices is triggered by the FIT deadline in China. Buyers cannot wait any longer to buy polysilicon for solar modules, if they want them produced and installed before the end of June. It is highly unlikely that polysilicon prices will continue increasing in the second half of the year, but a flat pricing outlook is certainly a possibility, if demand remains as high as previously forecast."



Credit: GT Advanced Technologies

Tighter import controls in China have contributed to a spike in polysilicon prices.

Suppliers

1366 Technologies secures major 'Direct Wafer' supply deal

US-based 'Direct Wafer' producer, 1366 Technologies, has secured a major supply deal with Hanwha Q CELLS that will enable the company to ramp its planned initial 250MW facility in Genesee County, New York state, in 2017.

The deal, based on 1366 Technologies having to meet certain terms and conditions related to its wafer qualification and timing of wafer deliveries with the ramp of the new production facility, would result in Hanwha Q CELLS purchasing up to 700MW of wafers over a five-year period.

Hanwha Q CELLS entered into an earlier development partnership with 1366 Technologies that achieved a solar cell efficiency of 19.1%, independently verified by Fraunhofer ISE. The company had previously announced longer-term plans to expand production in phases that would take the capacity to 3GW, equivalent to 600 million wafers per annum and create around 1,000 jobs.

Linde key materials supplier to new solar cell plants in Southeast Asia

Major electronics, gasses and chemicals supplier Linde Group has been awarded a number of gas and chemical supply contracts for new solar cell plants being established in Southeast Asia by leading PV manufacturers.

Many PV manufacturers are building greenfield cell factories for the first time in key countries in the region such as Malaysia, Thailand and India, and need to navigate permitting and licensing in a new country, enabling Linde to offer its turnkey services.

Andreas Weisheit, head of Linde Electronics said: "Project windows are very short and customers need a materials supplier who can successfully execute sourcing, logistics and engineering solutions on aggressive timelines."

Linde is providing bulk gases such as nitrogen, hydrogen, oxygen, argon and in some cases helium for solar cell

production. Specialty gases used in PV manufacture such as silane, ammonia, nitrous oxide, carbon dioxide, methane, hydrogen fluoride, phosphine and diborane were also being supplied through the subsidiary Asia Union Electronic Chemical Corporation (AUECC), which has manufacturing sites in mainland China and Taiwan.

Wacker confident on China future as trade deal nears expiry

German polysilicon firm Wacker Chemie hopes to continue selling to Chinese manufacturers beyond the expiration of its



Credit: Hanwha Q CELLS

Hanwha Q CELLS has made a major order of 1366 Technologies wafers for its planned US capacity ramp.



Hemlock Semiconductor is suing JA Solar for alleged breaches of a polysilicon supply contract.

existing trade agreement with Beijing.

China closed a loophole that permitted imports of materials to avoid duties if the end product, solar panels, were to be exported. A number of polysilicon firms from the US and Europe imported large volumes prior to the closure of the loophole and now face punitive duties.

South Korea's OCI was given a low tariff rate and Wacker was exempted until the end of April 2016 after a price undertaking was negotiated between China's ministry of commerce and the company.

With that expiration date now passed, the firm is confident that it will continue to be able to sell into China. Wacker and OCI both increased their market share in China as US firms were penalised. The move was interpreted by some as a retaliation for US duties placed on Chinese module manufacturers.

Shipments

Daqo hits record polysilicon shipments and lowest production costs

China-based polysilicon and wafer producer Daqo New Energy has reported that external sales volume and cost structure exceeded prior guidance as demand remained strong in the fourth quarter and full-year 2015.

Daqo reached a record-high quarterly polysilicon production volume of 3,547MT, an increase of 31.9% from 2,689MT in the third quarter of 2015 and 12% above its nameplate capacity, which had been expanded in 2015. Polysilicon production costs also reached a new benchmark for the modified Siemens process.

Daqo had reduced polysilicon average

total production cost to US\$9.74/kg and cash cost to US\$7.69/kg in the fourth quarter, with plants running ahead of nameplate capacity. Daqo reported fourth-quarter revenues from polysilicon sales to external customers of US\$42.9 million, compared to US\$34.1 million in the third quarter of 2015. The company saw wafer sales of US\$16.4 million in the quarter, compared to US\$12.5 million in the third quarter of 2015.

GET benefiting from higher wafer shipments as sales up 42.6% in March

Taiwan-based multicrystalline wafer producer Green Energy Technology (GET) reported March 2016 sales 42.6% higher than in the same period of 2015.

GET reported March 2016 sales of NT\$1,781 million (US\$55.02 million), an increase of 0.8% from the previous month as production utilization rates remain above 95%, but 42.6% higher than in the same period of 2015, primarily due to higher shipments and ASPs on tight supply.

However, GET expected wafer prices could vary mildly in the second quarter of 2016, due to seasonality and policy reasons. The company still plans to expand outsourcing of wafer capacity from partners to increase shipments in 2016. First quarter 2016 sales were around NT\$5,269 million (US\$163 million), compared to US\$124.6 million in the first quarter of 2015, around a 31% increase year-on-year.

Comtec reports 14.5% increase in product shipments for 2015

Monocrystalline wafer producer Comtec Solar Systems Group reported a revenue increase of 20.4% in 2015 on product shipments (ingot and wafers) up by 14.5%, year on year.

Total ingot and wafer shipments for the year were approximately 426.8MW, up from 372.7MW in 2014. In its financial results, Comtec also reported 2015 revenue of RMB1,091.2 million (US\$168.4 million), an increase of 20.4% from approximately RMB906.6 million in 2014.

Around 39.7% of total revenue (US\$66.9 million) for the year was generated from its major customer with manufacturing operations in the Philippines and Malaysia, down from 48.7% in 2014. Remaining sales were mainly generated in China, the US, Japan and South Korea.

The company has previously warned it would report a loss for the year, due to a series of write-downs, advance polysilicon payments and declining wafer ASPs. The firm's gross loss in 2015 was approximately RMB94.4 million (US\$14.57 million) for the year, compared to a gross profit of approximately RMB60.0 million in 2014.

Legal

Polysilicon producer Hemlock suing JA Solar for almost US\$1 billion

US polysilicon producer Hemlock Semiconductor has filed a lawsuit against JA Solar for allegedly breaching a long-term polysilicon supply agreement.

Filings with the Supreme Court of the State of New York by Hemlock Semiconductor claim that JA Solar made only one (US\$10.3 million) instalment of an initial advance payment of US\$103 million to secure polysilicon shipments starting in 2011. Subsequently, Hemlock Semiconductor claimed that JA Solar did not order or take delivery of any polysilicon under the 'take or pay' contract.

The polysilicon producer is seeking damages totalling no less than US\$921.1 million from JA Solar. JA Solar confirmed the court action, noting that the company was reviewing the claim.

Hemlock Semiconductor has previously filed a similar lawsuit against SolarWorld's former subsidiary, Deutsche Solar, for breaching a 'take or pay' contract as well as against Japanese module producer Kyocera.

Technology

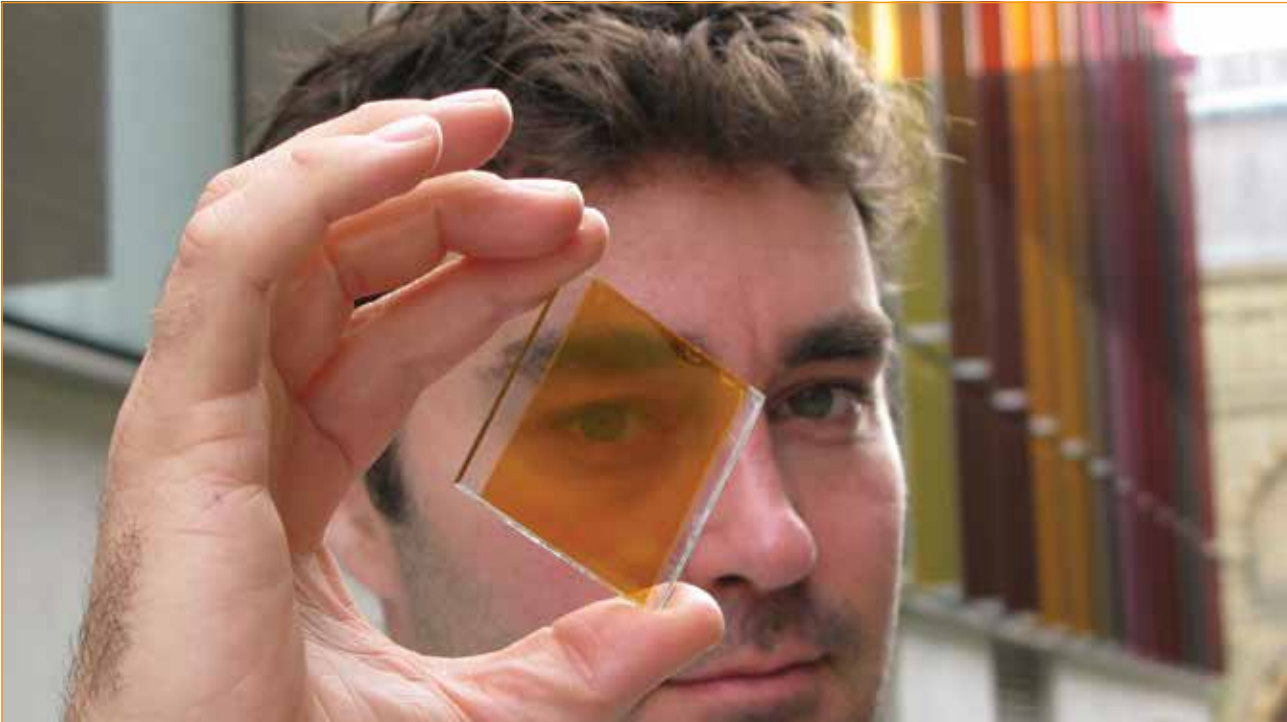
Sol Voltaics claims gallium arsenide nanowire alignment and orientation breakthrough

Materials start-up Sol Voltaics has claimed a breakthrough in the ability to deploy gallium arsenide nanowires in a thin-film format on crystalline silicon solar cells, creating the opportunity for nanowire alignment and orientation repeatability.

By demonstrating the ability to control nanowire orientation and alignment at the centimetre scale on a standard-sized wafer, Sol Voltaics could move the technology closer to commercial production of tandem solar cells and modules.

Erik Smith, chief executive of Sol Voltaics said: "By aligning nanowires within a membrane, we've taken our greatest stride yet toward manufacturing solar nanowire films at the commercial scale."

The company's development of its 'Aerotaxy' production technology to achieve cost-effective III-V nanowire production had also been progressing well. The Aerotaxy process creates the nanowires by suspending active materials in gases in a precisely controlled environment that then bond to form larger, uniform structures.



Credit: Oxford Photovoltaics

The commercial deployment of perovskite solar cells is close, according to Lux Research.

Lux Research bullish on perovskite commercialization timelines

Market research firm Lux Research believes the commercial deployment of perovskite solar cells could just be around the corner.

The firm believes that commercialization could occur between 2019 and 2021 as partnerships between start-ups and academia as well as more research groups consider spinning off work achieved so far into more start-ups.

A Lux Research report, 'The Rise of Perovskites: Identifying the Best Academic Partners to Work With', highlighted the significant success in a number of labs around the world that have produced remarkable cell conversion efficiency gains in just a few years with highest reported efficiencies of 21%, compounded by the fact that CIGS (copper indium gallium diselenide) thin-film cells have achieved efficiencies of 21.7%, yet have been in development for decades.

"While the efficiency question has been answered, there remain issues in stability, cost, and the feasibility of real-world efficiencies that must be addressed before commercialization can occur," said Tyler Ogden, Lux Research associate and lead author of the report.

ECN and Tempres reduce cell recombination losses with polysilicon layer

Energy Research Centre of the Netherlands (ECN) and PV equipment supplier Tempres Systems have developed a

new process that reduces solar cell recombination losses, boosting cell efficiencies.

Deposition of an ultra-thin polysilicon layer between the silicon wafer and the backside metal contacts on a conventional n-type monocrystalline solar cell significantly reduced recombination of the light-generated electrons, enabling a cell efficiency of 20.7%, with a possible roadmap towards cell efficiencies of 25%.

Bart Geerligs, senior researcher at ECN, said: "An important advantage of the solution is the possibility for integration with existing mass-production processes. Therefore, it is not necessary to introduce much new process equipment. This innovation leads to robust improved results with perspective for lower electricity costs."

Although the technique had already been applied in microelectronics and solar cells in the laboratory, this was the first time it had been implemented with production-scale tools and solar cells.

NexWafe raises €6 million to produce customer test wafers

Novel epitaxial wafer technology start-up NexWafe, a spin-off from Fraunhofer ISE, has raised €6 million (US\$6.8 million) in Series A funding from Swiss-based private equity firm Lynwood.

The funds are to be used for the production of monocrystalline-based solar wafers using NexWafe's high-temperature APCVD multi-chamber reactor technology, which is required for customer evaluations ahead of potential wafer orders and commercialization.

The NexWafe epi-wafer is able to achieve 20% plus cell conversion efficiencies at production costs lower than conventional mono wafer production cost levels.

Marina Groenberg, chief executive of Lynwood, said: "NexWafe's technology will be instrumental in the silicon wafer business serving the PV industry, which is continuously searching for new ways to cut overall cost of high-efficiency silicon PV modules. With its EpiWafer technology the NexWafe team will implement a disruptive manufacturing process that will enable to drastically reduce the cost to manufacture high efficiency Silicon wafers."

Heraeus launches low-temp Ag-pastes and new lab in Japan

PV metallization paste producer Heraeus Photovoltaics has launched a new family of low-temperature Ag-pastes.

The firm's new SOL500 series is formulated for cell types that could not withstand high firing temperatures. The SOL560 paste was designed for heterojunction solar cells that require curing temperatures below 200 °C, while the SOL530 accommodates even lower temperatures in the range of 125-135°C for the production of organic solar cells.

The SOL560 can also be stored and processed at room temperature, which relieves PV cell manufacturers from time-consuming freeze and unfreeze processes. The new pastes meet new grid and busbar applications and are claimed to demonstrate excellent adhesion on ITO or other TCO materials that enable improved printability and excellent line conductivity with minimal pinholes.