



26th European Photovoltaic Solar Energy Conference and Exhibition

Show Daily

5 SEPTEMBER 2011

WELCOME TO THE 26TH EU PVSEC

The 26th European Photovoltaic Solar Energy Conference and Exhibition (26th EU PVSEC) opens its doors and welcomes the global PV community in Hamburg, Germany. This unique PV solar gathering constitutes the most inspiring science-to-science, business-to-business and science-to-industry forum for the global PV Solar sector.

The exhibition area for the 26th EU PVSEC has been expanded to 80,000 square metres in nine exhibition halls. PV professionals from more than 100 countries are expected to attend this

industry show that represents the entire PV value chain with 980+ exhibiting companies and organisations from around the world. Exhibitors include manufacturers of PV production equipment, manufacturers of photovoltaic solar cells and modules, systems suppliers, companies and organisations specialised in project development, research institutes, finance and consultancy.

The Conference Programme of the 26th EU PVSEC covers the entire scope of PV technologies in 82 Sessions with 28 Plenary, 313 Oral and 1,150 Visual Presentations. Over 4,000

representatives from science, research and industry present and discuss the latest trends and developments at the world's largest PV Solar Conference. A number of Parallel Events take place in addition to the Scientific Conference Programme and the PV Industry Exhibition. The EU PVSEC Parallel Events have been further expanded by new elements. Those one-day events offer a deep insight into specific topics and include the latest scientific, technological, market and business related trends.

We wish all participants successful days in Hamburg, many new findings, good business and strong signals to a bright future for PV solar energy. Enjoy your stay and catch the latest results for the next generation of photovoltaics.

Heinz Ehmann
EU PVSEC Communications

Inside:

- Interview: Oerlikon's Chris O'Brien
- Interview: BTU's Jack McCaffrey
- Don't Miss Event: PV Production Forum
- teamtechnik: 6 GWP Production Capacity
- Finding your way around
- Parallel Events
- Technology highlights



INTERVIEW

CHRIS O'BRIEN, OERLIKON SOLAR



Washington, DC-based Chris O'Brien is head of market development for Oerlikon Solar. He has held senior management positions in the solar PV industry since 1995 and has prior career experience in the energy efficiency and independent power industries. Chris has played a leadership role on the board of directors for the Solar Energy Industries Association (SEIA) for many years, and is also on the board of several other solar and renewable energy trade and advocacy groups.

What can be expected from Oerlikon Solar at the EU PVSEC?

Oerlikon Solar will have an exhibit on the expo floor (hall A4, booth A12) and will be making a large number of presentations during the conference on amorphous and microcrystalline solar cells, on recent developments of high-efficiency Micromorph® tandem solar cells, module efficiency, and on PC system performance of different module technologies.

Oerlikon Solar will highlight its ThinFab™ production line for manufacturing of thin film silicon modules and its recent announcement that it secured its first order of a turnkey 120-MW-Micromorph® production line from a new customer in Asia. Oerlikon Solar will also highlight the ThinFab™'s recent certification from TÜV Rheinland, an independent German technical service provider. The thin film silicon solar modules from the ThinFab™ (in the range of up to 147 Wp) passed all tests required by TÜV Rheinland standards.

What do you expect from the EU PVSEC?

Because EU PVSEC is a leading photovoltaic event that covers a spectrum of PV topics and brings together industry leaders and solar professionals from all over the world, the conference allows Oerlikon Solar to connect with customers, technology partners and prospects, all working to help Oerlikon Solar achieve its mission in establishing photovoltaics as an economically viable energy source.

Can you tell us more about your recent ThinFab sales announcement?

Last year, Oerlikon Solar launched the production line ThinFab™ for manufacturing of thin film silicon modules, achieving record breaking production costs of € 0.50 per Watt peak (Wp). This year, Oerlikon Solar announced its first order of a turnkey 120-MW-Micromorph® production line from a new customer in Asia. This new order is the first

one for a complete 120 MW production line. Strong customer interest and market demand for thin film innovation is generating heightened interest in Oerlikon Solar's solutions.

Asia is becoming more and more important for the PV sector—what impact does this development have on your business? What are other growth regions?

Asia is the fastest growing region for the solar industry today and has become a preferred place for solar manufacturing. Oerlikon Solar has a strong and growing market presence in this important region, with approximately half of our customers located in China and Taiwan, and with our recent announcement of a ThinFab turnkey line sale in that region.

Another key trend in the global PV market is the rapid growth expected in regions with fast growing energy needs such as North America, India, North Africa and the Middle East. In these regions, specific features of the thin film silicon will become important. For example, thin film silicon modules show lower performance loss at high temperatures, and the electricity yield in low-light conditions is measurably higher than with crystalline.

What market opportunities do you see in the future for the thin film silicon technology?

The global trend toward large-scale solar plants, including large-scale projects with utility customers or utility owners, is a favorable factor of the utilization of thin film—the larger the existing space, the better thin film modules can exploit their advantages.

Another important factor in thin film silicon's promising long-term outlook is its sustainable environmental footprint. The energy payback period—meaning the time that a module requires to recover the energy used in its production—is significantly shorter than for crystalline technologies as the energy use in their production is lower.

INTERVIEW

JACK MCCAFFREY, BTU INTERNATIONAL

We catch up with Jack McCaffrey, BTU International's vice president of operations and engineering, to find out how BTU is leveraging its abilities as it ramps up fabrication of key new alternative energy products and technologies.

Jack, your background is on the cell side. How did you get into cell processing equipment at BTU?

I have been in the solar cell industry for about 13 years now, and when I joined BTU, I realized the global importance of renewable energy. By working in the industry, you feel like you are doing something important, not just for yourself, but for the world. This provides a true sense of importance and self-satisfaction. I first was drawn to BTU because of the company's renewable energy focus. As an equipment supplier, we are exposed to a wide variety of customers and suppliers and it is interesting to see all the different techniques and capabilities that different companies have. It is rewarding to be a part of numerous clean energy technologies such as both silicon and thin-film solar and fuel cells.

We also are involved in the nuclear industry, an important renewable energy source, through the nuclear fuel sintering process.

Driving toward lowering the cost per watt, how do you accelerate the cycle of technology adoption, shorten the learning curve and help manufacturers realize a lower cost per watt?

Cost per watt is the key focus for the solar industry. Solar is likely the most non-invasive form of energy able to generate electricity. Even the supply chain is fairly clean, especially in regard to silicon. The largest issue with solar is that it is expensive; it still does not come close to the unmitigated cost of fossil fuels. This cost comparison underestimates the true costs of fossil fuels because it does not take into account the cost of pollution and other issues caused by fossil fuels. However, we do not look at it that way today. Coal, our number one source of electricity, still is cheaper than solar. So, the key is to drive solar to unsubsidized cost parity and the question is how to do that more quickly. It is



important that equipment players play a more active role in that process. Our goal, through our process lab and applications team, is to become a partner in the exploration of novel and better ideas to help improve the cost per watt, and not just to be passively waiting for customers to come in and tell us what they want. Clearly the focus in the next decade needs to be on high-volume manufacturing, uptime and yield. I think there is a lot of evolution needed there. It is important that customers allow us the access and understanding to the things that are driving their costs. We want the lowest cost in equipment, we want the most efficient lines, and this will lead to the most rapid adoption of solar energy.



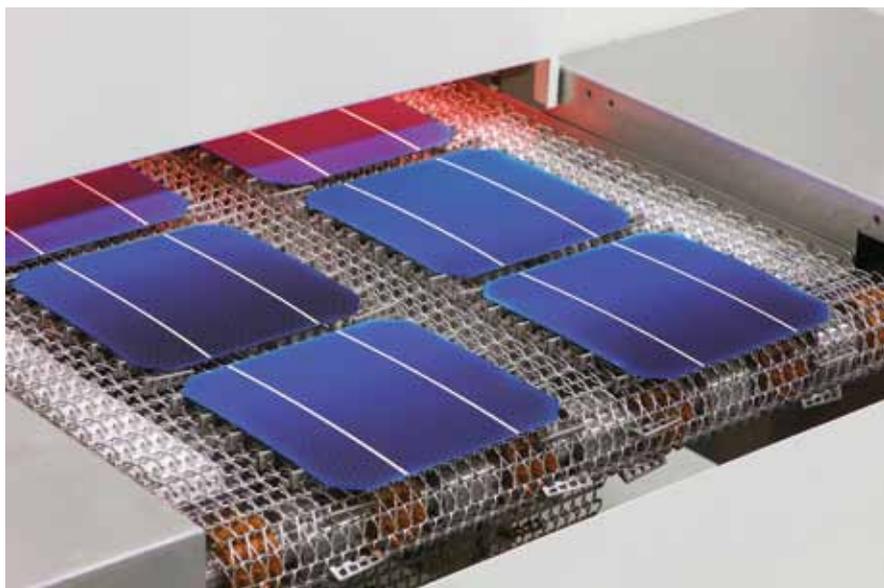
What is the most important thing that equipment makers can do to impact the industry today?

One of the unique values that I have in the industry is that I have been involved in both thin-film and silicon solar production. Therefore, I have a production and engineering perspective of how equipment should work and what would be most ideal for equipment

tively inexpensive. Therefore, you have to think a little more carefully about what you can afford and do it in a way that does not increase the cost of the equipment dramatically. It must be a collaborative process with the customer because we can never see the need as clearly as they can. In the end, it helps us add more value to our equipment and it helps them lower the cost of their lines.

and developing an understanding of how we can control that transient variability, and effect and create the necessary ramp up and down without damaging the product.

We realize that most of our customers have developed their processes in a batch mode in which the uniformity typically is very good. For us to adopt anyone's process to in-line, high-volume manufacturing customers must know that their process conditions will not be disadvantaged. The better we can define the tool, from "inside" to "outside," the better process scientists can be comfortable with what they are going to get. The one thing I have realized throughout my manufacturing experiences is that process scientists often get high efficiencies or better crystal growth materials. As you move to high-volume manufacturing, some of the high performance gets lost. I think that modeling can be a bridging factor to help us visualize and understand how to design an inline tool to minimize the losses that may occur due to noncompliance with customer processes.



makers to provide. There are a couple of areas that are important. Today, in many cases, off-line product monitoring is necessary. Typically, that involves both product removal and line disruption. In-situ monitoring, which is common in the semiconductor industry, is still rare in solar cell processing.

As a result, we are working on in-situ monitoring tools, which do not destroy the product, and can maintain yield and avoid transients. These measurements truly reflect product performance, not just machine performance, and real-time analysis, leading to better process control. With this in-situ system, users can respond to transients faster, understand processes more accurately, and avoid waste, scrap and an unnecessary step. It potentially could be a significant cost savings. That is an example that many industries have adopted, and I think the solar industry is at the early stage of that adoption. The dilemma with solar, unlike the semiconductor industry, is that the end products are rela-

What are some of the latest advancements in technologies and design tools for thermal processing equipment?

Currently, we are developing good three-dimensional models for systems that deal with radiant, convective and conductive heating. The most recent issue, which most often is seen in thin-film and in the fuel cell market, is how the machine will perform in the transient state. Today, work still must be done in the soak zone or steady state regions where the key process steps are being performed, but this raises the question, "what happens in the transient area?" These are areas that we have some experience with and often offer some commentary on because we have sold many products to many customers. However, our estimates often are experiential as to how or what a customer might see or get in their process. Obviously, this is not the ideal situation, so our current frontier for modeling work is going to look at transient response

How are you leveraging your China facility as the solar industry expands in that region?

When I started at BTU, we were really a US-based engineering company with many decades of knowledge on designing and building equipment. . In the past three years, the engineering group in China has been developing its understanding and has developed a sustaining capability to support existing mature products. We have made a deliberate effort to bring the China team closer to the new product cycle. We believe that it is important for the China engineering team to become familiar with the tools and capabilities in order to become active players in the design phase of the products for the markets present in China. The enabling technologies for this are the CAD tools and modeling software required to design products, just as we have in the US. We incorporated a WindChill system with the purpose of allowing models to be transferred between sites. In the early days, a simple model might take 12-24 hours to

Continued on p. 14

After Each Brainstorm, a Bright Idea.

Trailblazing is in BTU's DNA. We invite you to join us on the horizon of groundbreaking solar technologies, in both Silicon and Thin Film Photovoltaics.

We are relentless in our pursuit to keep your costs down, while pushing efficiency, uniformity and volume production to unprecedented heights.

Seasoned by over 50 years of experience, our customer care is uncompromising and partnership-driven. Log on or call today. You'll find the brightest ideas under the sun are generated at BTU.

[www. BTU .com](http://www.BTU.com)

**Pioneering Products and Process Solutions for
In-Line Diffusion • Metallization • Thin Film**

BTU

the Next Gen



PARALLEL EVENTS

MORE THAN MERE CONFERENCE & TRADE SHOW

In addition to the Scientific Conference Programme and the PV Industry Exhibition, a number of parallel events are taking place this year.

EU PVSEC Parallel Events offer a deep insight into specific topics and include the most recent scientific, technology, market & business trends. The EU PVSEC Parallel Events have been further developed and structured, and are part of the official EU PVSEC Programme.

If you are registered for the EU PVSEC Conference (One Day or Full Week) admission to all EU PVSEC Parallel Events is included on the day(s) you registered for. Special One Day Admission is also available (€370 onsite).

Monday, 5 September

The half-day **8th European PV Industry Summit** addresses industry players and policy makers as well as investors wanting to know more about the potential of the PV sector. A top-level policy maker will explain the political and regulatory perspective for the development of renewables within the energy mix, and two panels featuring CEOs of the world's biggest PV companies will examine current key issues of the industry. The first panel will discuss the global PV supply and demand balance as well as the potential for further PV cost reduction. The second panel will concentrate on grid parity and the necessary up-upgrades in grid infrastructure.

Tuesday, 6 September

The **PV Production Forum** addresses best practices and case studies that can assist PV production management, purchasing staff, and product managers how to increase throughput, efficiency, and save money in their production fabs. The Forum will feature presentations arranged around several focal topics including silicon and thin film production, which will be led

by IPVEA members and other industry experts.

Photovoltaics, Forms, Landscapes: How to Use Photovoltaics for Shaping Performative Landscapes highlights the interaction of photovoltaic systems with buildings and landscapes, by showing how architects take up this challenge. Four keynote presentations on the transition from photovoltaic architecture into urban and non-urban landscapes will be followed by a round table discussion.

Investors Day—Investing in the Future features interactive sessions between key and new players in the PV industry and the financial community. The day will include CEO-level speakers from the industry as well as representatives from banks, investment funds, insurance companies and analysts.

Wednesday, 7 September

Improvement of efficiency while keeping the prices low compared to the competitors – this is the main challenge for producers of solar cells. In the **Photonics Forum 2011**, the leading German photonic companies are presenting their latest developments and highlighting the potentials still unexploited in this technology.

With governments acting to redesign PV support schemes, what may be the approach to widespread PV deployment in the medium-term? **Driving Future PV Deployment—Electricity Utility PV Business Models** explores the potential role of the electricity businesses and regulators.

The **EU PVSEC Business Forum 2011** focuses on one of the key questions for the global PV industry: Are PV Industry's Business Models of Today Suitable for Tomorrow's Markets? Four overview presentations will lead into a moderated panel discussion focussing on the critical success factors in the strategic, structural, financial and organisational aspects of the

Monday, 5 September 2011

- 8th European PV Industry Summit

Tuesday, 6 September 2011

- PV Production Forum 2011
- Photovoltaics, Forms, Landscapes
- Investors Day

Wednesday, 7 September 2011

- Photonics Forum 2011
- Driving Future PV Deployment
- EU PVSEC Business Forum 2011

Thursday, 8 September 2011

- Sustainability Aspects for TeraWatt-Scale Photovoltaics

Monday to Thursday, 5 - 8 September 2011

- Industry Presentations

future PV industry.

Thursday, 8 September

Photovoltaics is inherently renewable, but not automatically fully sustainable. In view of the foreseen very large increase in PV manufacturing and installations to the terawatt-level, it is essential to address the manifold of sustainability-related challenges timely and explicitly. **Sustainability Aspects for TeraWatt-Scale Photovoltaics** offers critical examples of sustainability-related issues of today's and future photovoltaics.



AWARDS & PRIZES

European Becquerel Prize for Outstanding Merits in Photovoltaics

The European Becquerel Prize for Outstanding Merits in Photovoltaics will be awarded during the Conference. This prize was established in 1989 on the occasion of the 150th anniversary of Becquerel's classical experiment, which laid the foundation of both photovoltaics and photography by detecting the photovoltaic effect. The Becquerel Prize will be awarded this year for the nineteenth time.

Past recipients

1989 Prof. Roger Van Overstraeten
 1991 Prof. Werner Bloss
 1992 Prof. Antonio Luque
 1994 Dr. Morton Prince
 1995 Dr. Karlheinz Krebs
 1997 Prof. Adolf Götzberger
 1998 Dr. Walter Sandtner
 2000 Mr. Frederick C. Treble
 2001 Prof. Viacheslav Andreev
 2003 Dr. Wolfgang Palz
 2004 Prof. Masafumi Yamaguchi
 2005 Prof. Joachim Luther
 2006 Dr. Dieter Bonnet
 2006 Dr. Richard M. Swanson
 2007 Prof. Arvind Shah
 2008 Mechtild Rothe
 2009 Dr. Andreas W. Bett
 2010 Prof. Hans-Werner Schock

26th EU PVSEC Student Awards

To encourage high-quality work among young researchers, on the occasion of the 26th EU PVSEC the EU PVSEC Student Awards will be delivered in recognition of the most remarkable and outstanding student's research work in the field of PV.

Six awardees, one per main conference subject, are nominated by the Scientific Committee. The prizes will be awarded in the respective conference sessions when the presentations of the winners take place.

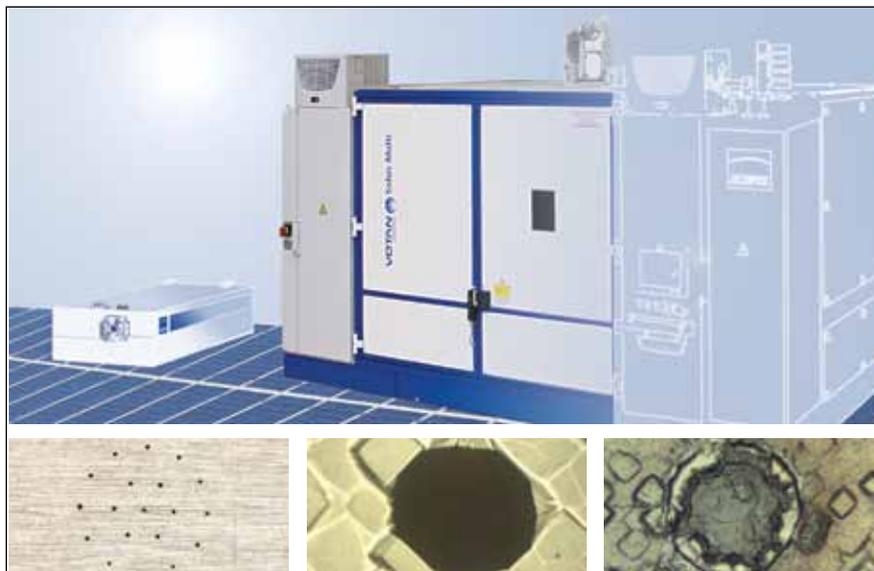
EU PVSEC Student Awardee Presentations:

Tuesday, 6 September, 08:30, Hall 2

Releasing Coatings for PV Silicon Processing by Liquid Routes: Comparison between the Conventional and a New High-Purity Coating

Tuesday, 6 September, 17:00, Hall G2

A Novel, Lead-Free Soldering Process for



Sharing Excellence in Photovoltaics.

Jenoptik introduces the newest laser sources and laser machines:

- JenLas® disk IR50E / IR70E with optimized, independently adjustable laser parameters
- SED technology module for Selective Emitter Doping of crystalline solar cells



Optimize your solar cell processes by using our overall competence. Would you like to learn more?

Visit us at: [Hall A1, Booth B9](#)

[Lasers & Material Processing](#)
www.jenoptik.com/pvsec2011



Concentrator Photovoltaic Cells

Wednesday, 7 September, 15:15, Hall G1

Exploring the Possibilities of PV Systems in Restoring Heritage Buildings

Thursday, 8 September, 15:15, Hall 2

Development of Reliability Model for Residential Solar Photovoltaic

Energy Systems Using MCMC

Thursday, 8 September, 15:15, Hall G1

Efficiency Improvement of Flexible Cu(In,Ga)Se₂ Solar Cells from 14.1% to 18.7%

Thursday, 8 September, 17:00, Hall G2

Grid-Integration of Distributed and Renewable Energy Resources by Schedule Management, Demand-Side Management and Electrical Energy Storage

PARALLEL EVENTS

INDUSTRY PRESENTATIONS

A brief overview of the industry presentations the 26th EU PVSEC has on offer as part of its Parallel Events programme.

Product categories featured in this year's presentations:

Equipment & Materials Production Equipment Glass Producers Deposition Equipment Laser and Opto-electronic Devices Chemical Compounds and Gases Integrators/Assemblers for Production Lines Wafer, Cell, Module Processing Coating for Thin-film Processing Laminators and Products for Lamination Handling and Packaging	Balance-of-Systems Components Mounting and Tracking Systems Inverters Batteries/Charge Regulators Cabling and Connection Material	Individual Categories Governmental Authorities/Associations/ Utilities Engineering/Consulting Project Development Research/Laboratory Educational Sector/Universities Promotion/Financing/Investment Media/Publishers Software/Simulation Recycling, Waste Treatment Measurement and Control Technologies Certification/Accreditation incl. Inspection and Testing Others
	Distributors, Assemblers Suppliers/Distributors Integrators/Assemblers for PV Systems	
	PV Products Silicon/Ingots Wafers/Solar Cells Wafer-based PV Modules Thin-film PV Modules Concentrator Modules BIPV Products	

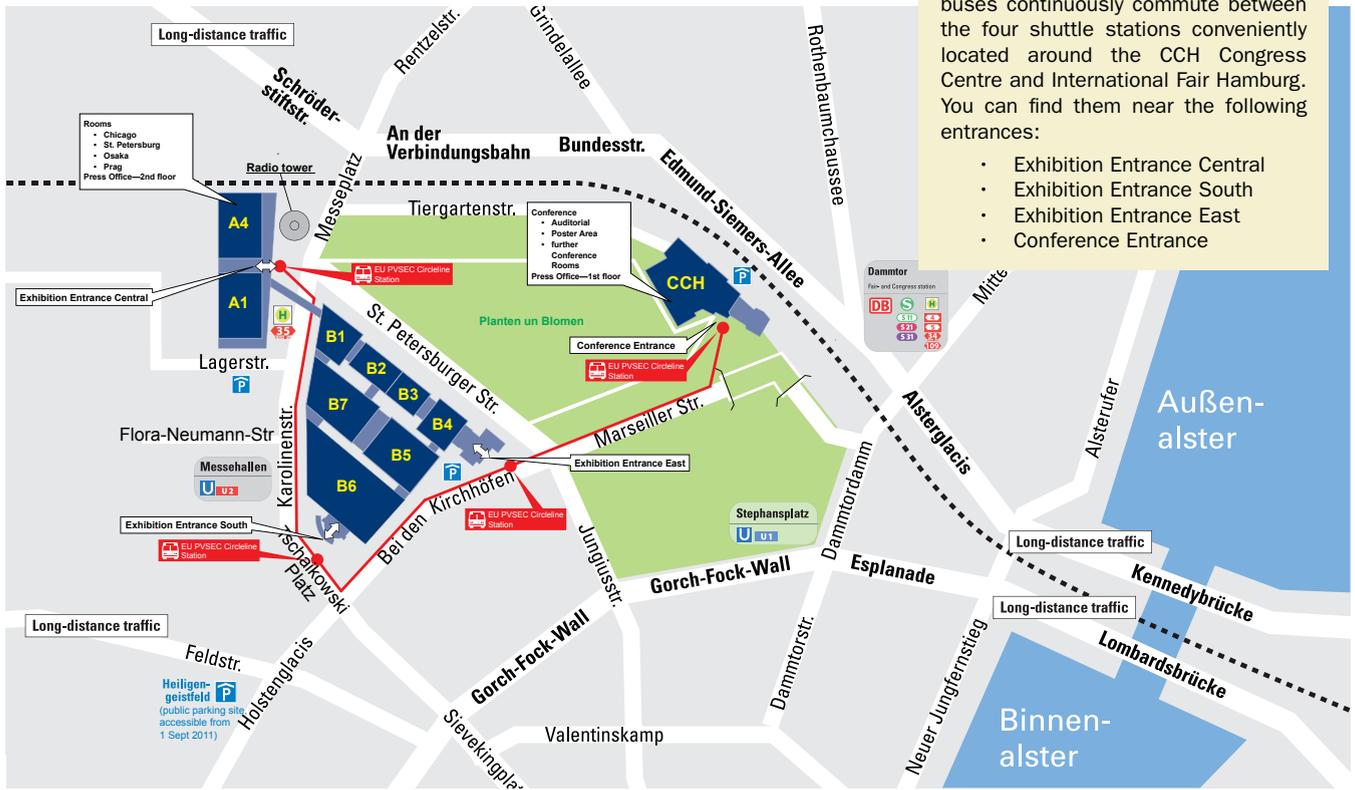
Overview of this year's schedule:

	Monday, 5 September	Tuesday, 6 September	Wednesday, 7 September	Thursday, 8 September
10:00	Manz	Dr. Schenk	Oxford Instruments	Costa Rican Inv. Promotion Agy
10:15	DESY	AIS Automation Dresden	CS Clean Systems	Krempel
10:30	Sinusstrom	Starsoft (Europe)	Gustav Hensel	NSG Group (Pilkington)
10:45	Picosun Oy	Pfieber Vacuum	4JET Technologies	Photo etc
11:00	IBM Corporation	Jinko Solar	Schmid, Gerb.	Materion Advanced Chemicals
11:15	IMG Sachsen-Anhalt	Intertek	Dow Corning	First Solar
11:30	Bosch Rexroth	Solutronic	SAES Getters	REC ASA
11:45	DEK Solar	Germany Trade & Invest	Saint-Gobain Solar	Merck
12:00	REIS Robotics	Singulus Technologies	KACO New Energy	Schunk Kohlenstofftechnik
12:15	Schneider Electric	Schiller Automation	Lisec Maschinenbau	MBJ Solutions
12:30	OBO BETTERMAN	ET Solar	Solland Solar Cells	Namics
12:45	Christian Koenen	AEG Power Solutions	SEMILAB	Walser Profile Deutschland
13:00	Hitachi Chemical Europe	Vacon	Mounting Systems	Op-tection
13:15	skytron energy	RefuSol	Madico	Jenoptik
13:30	Günther Spelsberg	SMC Pneumatik	Suntech Power Int'l	Hanwha SolarOne
13:45	Newport Spectra-Physics	SunPower Systems	Transform Solar	ViscoTec
14:00	alfasolar	ATMgroup	Daikin Chemical Europe	KÖMMERLING
14:15	Atlas Material Testing Tech.	Eurener	3D-Micromac	MacDermid Photovoltaics Sol.
14:30	Meco Equipment Engineers	ATN Automatisierungstechnik	ROFIN-BAASEL Lasertech	Solvay Specialty Polymers
14:45	TRUMPF	Spire	IBHS Energy Engineering	Noritake
15:00	InfraTec	develop Mechanics	Skyline Solar	Sun Edison
15:15	Carl Zeiss	f solar	camLine	Gas Recovery & Recycle
15:30	SYSTEMA	EBARA Precision Machinery	August Mössner	Shinsung Solar Energy
15:45	LayTec	Kurt J Lesker Company	JUST VACUUM	EPC Group
16:00	Steca Elektronik	SEMI PV Group	Precitec Optronik	Looser Chemie
16:15	GecModel Solar	Trident Industrial Ink Jet	Philips Innovation Services	Praxair Deutschland

THE BIG EVENT FINDING YOUR WAY AROUND

EU PVSEC makes it easy to get around this sprawling event thanks to its free EU PVSEC Circleline shuttle service, sponsored by Canadian Solar. Shuttle buses continuously commute between the four shuttle stations conveniently located around the CCH Congress Centre and International Fair Hamburg. You can find them near the following entrances:

- Exhibition Entrance Central
- Exhibition Entrance South
- Exhibition Entrance East
- Conference Entrance



Residential



Buildings



Power Plants

Now get a solar solution that brings enhanced availability to any size installation

Solar farms and large buildings

Supervision, security, real-time monitoring — it's all part of our high-availability, large-scale solar solutions with optional service plans to guarantee uptime.

Residential and small buildings

Now your customers can get a complete grid-tie or off-grid electrical system, from state-of-the-art wiring boxes and inverters to innovative monitoring and control software.

Worldwide service capabilities

From product availability to worldwide services, Schneider Electric brings reliable solar power to wherever you happen to be.

Bring this Advertisement to our booth during **EU PV SEC (B7.A1)** and pick up a solar pedometer while supplies last.

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Visit us at
EU PV SEC
Booth B7/A1
5-8 September, Hamburg
(Germany)

ON THE EXHIBITION FLOOR

TECHNOLOGY HIGHLIGHTS



Alpha—Stand A4/B15

ALPHA® introduces their new line of PV Ribbon products. Alpha's PV Ribbon is produced with state-of-the-art equipment and is designed to meet the challenging requirements of the most sensitive cSi solar module assembly processes. ALPHA® PV Ribbon has low yield strength, low camber and is very flat, making it the perfect solution for assemblers looking for interconnecting ribbon that is easy to use and produces highly reliable solder interconnects that stand the test of time. www.alphapvribbon.com

Arnold Gruppe—Stand A4/A9

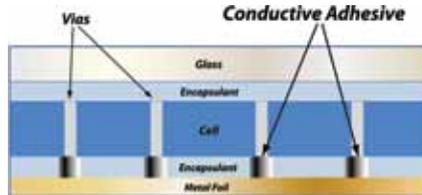
Arnold Gruppe introduces new and technically innovative high-end machines and solutions for silicon brick manufacturing. The focus of the company presentation is the live demonstration of the combined surface and chamfer grinding machine, type 72/865. This machine can already be used economically for small and medium sized brick production capacities. A process capability of > 1,67 cpk at a tolerance of +/- 0,05 mm can constantly be obtained and paves the way to get the required "Zero Error Strategy." www.arnold-gruppe.de

Beckhoff—Stand A4/A23

With PC-based control, Beckhoff offers a universal, consistent and high-performance control platform, with optimization potential for the entire process of photovoltaic production, from wafer to cell and module. At the PVSEC, Beckhoff will present its range of solutions based on robust and high-performance Industrial PCs, fieldbus components, Drive Technology and TwinCAT automation software, as

well as EtherCAT, the real-time Ethernet system and XFC (eXtreme Fast Control), the high-speed machine control solution. www.beckhoff.com

ECM—Stand A1/B4



Engineered Conductive Materials has its new line of conductive adhesives for back contact solar module applications. At its stand these adhesives are stress absorbing to withstand the rigors of thermal cycling, and have excellent conductivity stability to back contact metallizations during damp heat exposure. The conductive adhesives are designed to cure through the encapsulant lamination and cure process. www.conductives.com

Henkel—Stand B6/B11

Henkel is presenting powerful solutions spanning the entire value chain. With solutions from Terostat and Loctite, Henkel provides the photovoltaic industry with powerful adhesives, sealants and cleaners for the production and installation of solar modules. For instance, outstanding and reliable results are ensured by high-strength frame bondings that are ready for transport within a few minutes or durable and highly resistant backrail bondings. Furthermore, specialists at Henkel are also displaying different adhesive solutions for backsheets used in PV solar modules. www.henkel.com

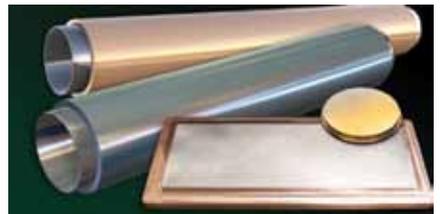
Heraeus—Stand A4/B9

Heraeus will be highlighting their SOL9410 and SOL9411 front side silver pastes for conventional cell, which has gained wide acceptance due to its optimized high efficiency and throughput processing. These new and improved pastes exceed the quality of standard pastes and are each optimized for varying emitter depths and concentrations. They will also be highlighting their SOL9383 Series for N-Type

cells with P+ surfaces. This paste provides high efficiency, high conductivity and fine line resolution.

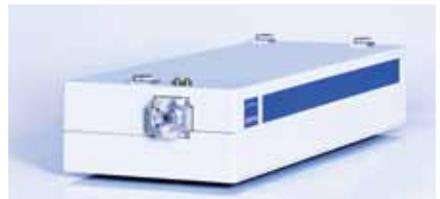
Heraeus will also be highlighting two new products, the SOL205 low silver content back-side paste and the SOL500 Series of low temperature metallization pastes for thin film and advanced crystalline cell technologies. www.pvsilverpaste.com

Indium—Stand A4/B19



Indium Corporation is featuring its newly developed copper-gallium and indium rotary sputtering targets. The targets are made by Indium Corporation's vertically integrated proprietary process utilizing aerospace powder metallurgy technology. The production process output produces a consistently homogeneous alloy with low PPM contaminate levels and consistent density throughout the target, resulting in very consistent sputtering film properties. www.indium.com

Jenoptik—Stand A1/B9



Jenoptik's Lasers & Material Processing division presents its novelty in the field of laser sources for solar cell processing. With the consequent further development of the already introduced and proven infrared disk lasers of the JenLas® disk family, Jenoptik now adds the new laser sources JenLas® disk IR50 E and JenLas® disk IR70 E with optimized, independently adjustable laser parameters for the photovoltaics sector to that product range. Those E-version lasers (E = extended) achieve

shorter pulse lengths, significantly higher repetition rates, and constantly high pulse energies. www.jenoptik.com

Montech—Stand A4/B23



Montech AG is displaying new solutions to sort and turn over wafers and cells. Among other things, the Swiss company is presenting a new sorting system for wafers and cells, built with Montech's standard components. "It's an endless working cycle, without unproductive return track, that optimizes the sorting process," said Gianluca Aloisi, sales manager, Montech AG. Another innovation to be presented is designed for turning over wafers and cells. According to Aloisi, the solution developed

by Montech solves efficiently the problem of turning over parts. Furthermore, the solution offers smoother handling and greater flexibility compared to rotary wheels normally used in the photovoltaic industry. www.montech.com

Q-Cells—Stand B6/A38

Q-Cells launches the all-black Q.PEAK BLK module at the industry's largest international conference, PVSEC (European Photovoltaic Solar Energy Conference and Exhibition), in Hamburg. Q.PEAK BLK, combines aesthetics with a top performance of 245 Wp. The module offers protection against short-circuits caused by penetrating moisture due to junction box with protection class IP 67. Innovative Anti PID technology ensures no power loss. The module is extremely weather resistant. www.q-cells.com

Rehm—Stand A1/A20

Rehm is introducing EU PVSEC visitors to its RFS Fast-Firing System featuring low energy consumption and a compact footprint. Characterised by very high throughput rates, superlative profile control and leading thermal transfer efficiency, the system also incorporates

flexible transport systems that enable dual lane wafer handling if required. The Rehm stand will include a demo system showcasing the advanced transportation technology which drives throughput levels up to 3800 pcs. per hour. www.rehm-group.com

ROFIN—Stand A1/A2

ROFIN's 1000 Watt DQ010 laser offers the highest available power in the laser market for edge deletion applications. This allows ultrafast processing of up to 80 cm²/sec and high productivity using power or time sharing concepts. The PowerLine L 400 introduced at EUPVSEC last year has established itself very well in the Asian market for small size panels. Both lasers feature the ROFIN top hat beam profile to achieve the highest maximum efficiency per pulse. www.rofin.com

Saint-Gobain—Stand B7/B42

To enhance the efficiency of the solar module manufacturing process and save costs for module makers, Saint-Gobain Solar is launching its SolarBond® Membrane for photovoltaic (PV) panel

SAINT-GOBAIN COATING SOLUTIONS

Coating solutions from Saint-Gobain

Rotatable Molybdenum Sputtering Targets

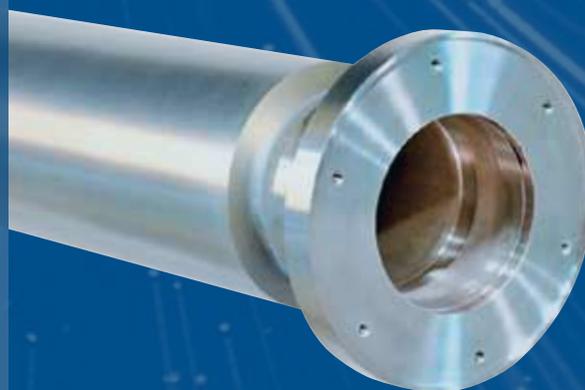
FOR PHOTOVOLTAIC AND FPD APPLICATIONS

Building on decades of experience in the coatings and deposition process, Saint-Gobain Coating Solutions brings innovation to the world of Molybdenum sputtering targets used for Photovoltaic and FPD applications.

ADVANTAGES OF OUR TARGETS

- High productivity
- Trouble-free sputtering deposition process
- High quality of the films deposited
- Backing tube cost reduction
- Flexibility of shapes with fast response time
- Optimized usage yield for customer

Please visit us
at PVSEC Hamburg
Hall B7 booth B 42




SAINT-GOBAIN
COATING SOLUTIONS

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Building Solar China

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中国国际光电建筑论坛暨展览会

Capture solar building business opportunities in China

9 – 12 June 2012

China Import and Export Fair Complex,
Guangzhou, China

held concurrently with

17th Guangzhou International Lighting Exhibition and 9th Guangzhou Electrical Building Technology

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messe frankfurt in a strategic alliance with



lamination. Constructed from a modified silicone-rubber material, SolarBond® Membrane demonstrates outstanding durability through repeated lamination cycles. Used as a process aid in securing and sealing all module components with ethylene vinyl acetate (EVA) adhesive film, the membrane is highly resistant to EVA outgassing at the high heat exposure (up to temperatures of 220°C) used in the module lamination process. It also retains its inherent flexibility and tear-resistance through repeated handling, protecting both the module and equipment to increase service life and lower costs. pv.saint-gobain.com

Saint-Gobain Coating Solutions—Stand B7/B42

Building on decades of experience in the coatings and deposition process, Saint-Gobain Coating Solutions brings innovation to the world of molybdenum sputtering targets used for photovoltaic and FPD applications. High productivity, trouble-free sputtering deposition process and high quality of deposited films are just a few of the advantages you will obtain when coating with the company's

monolithic rotative sputtering targets. Visit their stand today to speak with their experts. www.coatingsolutions.saint-gobain.com

SINGULUS—Stand A4/C3

SINGULAR TECHNOLOGIES AG presents the SINGULAR ICP-PECVD platform for the development and production of high efficiency silicon solar cells. SINGULAR is an ICP-PECVD coating tool for crystalline silicon solar cells which is used for the mass production of silicon solar cells. In addition to that, SINGULAR is applied more and more for the development of

PECVD coatings for high efficiency solar cells following conventional and new cell concepts. SINGULAR is a modular tool, consisting of several vacuum chambers which can be customized. www.singulus.de

Solarmax—Stand B7/B36

Newly commissioned grid-coupled inverters equipped with a direct medium-voltage connection in Germany must demonstrate their compliance with the directive "Generator plants on the medium-voltage network" by means of a unit certificate of the BDEW (German Association of Energy and Water Industries). The SolarMax central inverter 330TS-SV has now received this certificate. With its maximum system output of 1.32 megawatts, the modular SolarMax 330TS-SV is the most powerful central inverter that Sputnik Engineering manufacture and is used first and foremost for large-scale systems with an installed output of more than one megawatt. www.solarmax.com

teamtechnik—Stand A1/C1

teamtechnik's high-performance STRINGER TT1200 solders solar cell strings at 1200 cycles per hour on a single track, making it one of the fastest stringer systems on the market. A single track means higher throughput per soldering process, less complexity, fewer operators and a lower requirement for replacement parts. teamtechnik will be giving live demonstrations in Hamburg, in hall A1, on stand A1/C1. Everyday at 10 am, noon, 2 pm and 4 pm, the Stringer TT1200 will be using IR light technology to solder high-quality solar cell strings. teamtechnik specialists will provide a commentary on the whole process and highlight important system features. www.teamtechnik.com

Tenesol—Stand B5/A35

Tenesol showcases its latest PV and energy storage. The company will also take part in a scientific conference during the event to present its R&D project FIEMSER (Friendly Intelligent Energy Management System for Existing Residential buildings).

Tenesol will highlight its extensive experience in both on-grid and off-grid PV systems, its works as an EPC contractor, its advanced production facility in Toulouse, France, and its global distribution network. www.tenesol.com

Trident Solar—Stand A1/C23

Trident Solar's new single-step, jettable material performs as both an etchant and dopant. The material is used as a precursor to screen printing of contacts. This efficient and effective removal of the anti-reflective top layer allows for maximum contact between silver contacts and silicon. It then works as an n-dopant as it penetrates the silicon emitter directly below the contacts. This combination of etchant and dopant can create up to a 0.5 percent increase in solar cell efficiency. www.tridentsolarcell.com

VITRONIC—Stand B1U/A3

VITRONIC's camera-based inspection systems for the quality control of solar cells, wafers and modules allow the implementation of customized solutions for complex challenges and specific requirements. VINSPECsolar solutions are not only suitable for carrying out standard tasks in the quality control of solar cells, wafers and modules efficiently and safely, but also for complex inspection processes, sophisticated system integrations and flexible upgrades, where other systems struggle. www.vitronic.de

TEAMTECHNIK

6 GWP PRODUCTION CAPACITY WORLDWIDE

Visit stand A1/C1 to experience the high-performance STRINGER TT1200 from teamtechnik, capable of soldering solar cell strings at 1200 cycles per hour on a single track, making it one of the fastest stringer systems on the market. The system's single track means higher throughput per soldering process, less complexity, fewer operators and a lower requirement for replacement parts.

teamtechnik will be giving live demonstrations everyday at 10 am, noon, 2 pm and 4 pm. While the Stringer TT1200 uses IR light technology to solder high-quality solar cell strings, teamtechnik specialists will provide a commentary on the whole process and highlight important system features.

teamtechnik Group sells stringer systems producing a total of 6 GWp, making the company a global market leader in this segment.

A uniquely designed hold-down device in teamtechnik's systems separates the actual soldering process from the cell-handling process. This allows companies to



ensure 1200 cycles/hour, with a cycle time of three seconds. The hold-down device also ensures a safe process and perfect string geometry. At the same time, it guarantees extremely low breakage rates—from 0.1-0.3% depending on the type of cell.

At the show, teamtechnik is launching a standard 50 MW system, an adaptable modular package consisting of two STRINGER TT1200s and a layout. The

integrated 6-axe robot makes the system very flexible. It can be tailored to different applications and to a range of cell and glass sizes. The 50 MW systems are equipped with tried and trusted technology which makes them easy to install on the customer's premises where they are quickly up and running.

Making Solar **Better** with **Superior** Products

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Hall A1, Stand B4
September 5-8, 2011
Hamburg, Germany

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JACK MCCAFFREY, BTU INTERNATIONAL *CONTINUED FROM P. 4*

transfer from one engineer in the US to one in China that has been reduced to just minutes through the use of the WindChill software.

We now can collaborate, not just mentally but physically as well, through the use of CAD tools and modeling software to design and analyze products wherever and however we like using the required expertise, regardless of geographic location. So in a way, the 8,000 miles between the US and China have been greatly reduced. Working together allows BTU to never shut down; we are working night and day, and constantly sending information back-and-forth. At any time, someone at BTU is designing the next-generation product for our customers. Of course, the value of having the China team much more engaged is not just a time advantage, but they also are much closer to the custom-

ers and can speak their language. This allows us to be more sensitive to our customers' emerging needs. Our China engineering group is within a couple hours of many of the major Asian solar companies. If the engineer who is working on a customer's problem is only a quick day trip away from the site, there is increased opportunity to work together to quickly drive a resolution. Ultimately, this is about greater collaboration with our customers, which is truly our goal.

Are there other technologies on your roadmap that are showing promise for future implementation?

We have some patented technology around a hybrid microwave system. We believe that this technology can offer novel heating opportunities to create unique product advantages. It would

save power while delivering footprint advantages. At this stage, we are developing platforms because we realize that such technology needs to be absolutely proven to be a very commercially reliable technology. This year, our focus is to ensure that this can be developed in a design that meets the uniformity standards for which we are known. Only then can we count on this hybrid system to be a reliable technology to leverage. We believe that hybrid microwave technology does have a future, and there are many different markets for it. However, for now, the focus is proving that this technology is rugged and viable.

We are committed to alternative energy and always look for applications in which we can leverage our continuous processing technology to further the cause.

DON'T MISS EVENTS

PV PRODUCTION FORUM

JOINTLY ORGANIZED BY EU PVSEC & IPVEA

Don't miss the PV Production Forum taking place Tuesday, September 6th, from 8:30 a.m.-6 p.m. The PV Production Forum will feature presentations arranged around several focal topics including silicon and thin-film production, which will be led by IPVEA members and other industry experts. The forum will provide an essential opportunity for networking across all segments of the PV value chain along with informing its participants about the changing dynamics, technologies and developments in the PV manufacturing supply chain.

This forum addresses best practices and case studies that can assist PV production management, purchasing staff and product managers in learning how to increase throughput, efficiency and save money in their production fabs. The PV Production Forum 2011 is jointly organized by EU PVSEC and IPVEA - International PV Equipment Association during the 26th EU PVSEC.

Equipment Executive Roundtable Discussion

This roundtable discussion panel, moderated by Markus Hoehner, CEO, Hoehner Research & Consulting Group, is comprised of seasoned executives who will examine the current state of PV manufacturing, trends to watch for in the future and how those trends will affect the photovoltaic industry.

Panelists for the discussion include:

- Dieter Manz, Chief Executive Officer, Manz Automation AG
- Peter Tinner, Head of Sales & Marketing, Oerlikon Solar
- Peter Fath, CTO, Centrotherm Photovoltaics
- Dr. Charlie Gay, President, Applied Solar
- Dr. Patrick Hofer-Noser, CTO, Meyer Burger AG

FAB Manager Panel Discussion

The FAB Manager Panel Discussion will feature veteran managers representing

progressive, high-performing production fabs that will discuss the industry's most pressing challenges and brightest opportunities.

Moderated by Mark Osbourne, senior editor, PV-Tech.org, this year's panelists include:

- Huang Qiang, vice president of technology and director of State Key Lab of PV Science and Technology, China, at TRINA SOLAR LIMITED
- Dr. Florian Holzapfel, Chief Executive Officer, Calyxo GmbH
- Dr. Pietro Rossetto, Chief Engineer of Wafer Unit and Vice Director of Tech Center, LDK Solar
- Dr. Stuart Wenham, Chief Technology Officer, Suntech



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efficiency

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Heraeus' industry-leading silver pastes are specially formulated to increase the efficiency, performance and output of your solar cells—while reducing your cost-per-watt. Our front-side pastes are customizable by our R&D staff to meet your individual requirements, and we develop several new formulations each year for novel architectures, such as MWT, High Sheet Resistance, Selective Emitter and N-Type cells. Our back-side pastes also provide low cost and optimized adhesion characteristics. With production facilities in Asia, Europe and North America, Heraeus is already increasing capacity to supply your production needs—whenever and wherever you need us.

Visit our booth at the
26th European Photovoltaic Solar Energy
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International Fair Hamburg • Hall A4, Booth B9

September 5 - 8, 2011

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