

# Taking a leading position

As one of the industry's prime operators, Schmid Silicon Technology (SST) GmbH enjoys an enviable reputation and business that is built upon exceeding expectations and unrivalled knowledge. We put the questions to Dr. Burkhard Wehefritz, Director of the company's Sales Development Department.



**PES:** Welcome to PES magazine. Can you explain a little about your company and how you serve the solar/PV industry?

**Burkhard Wehefritz:** SST is a technology and engineering company specialised on the development, design, construction, start up and maintenance of turnkey facilities, engineering services and components for the polysilicon and monosilane production, like Hydrochlorination, Disproportionation (author's note TCS to MS) and monosilane CVD reactors. The company has been set up in 2006 and further developed a new generation production process compared to the traditional TCS Siemens process for the production of solar- and electronic-grade polysilicon.

Based on proprietary knowledge and technology, it has set up a production facility (SPP, Schmid Polysilicon Production) in Saxony/Germany and has started marketing its turnkey fabs, engineering services and components to customers around the globe. The Saxony-based production site is an industrial-scale monosilane plant of which about one third can be converted to polysilicon. Another major purpose for SST however, is its use as the process development platform as well as the training center for client operators. The production process there is based on SST's proprietary monosilane technology and SPP announced its First Silicon Out in June of 2011 with "electronic grade quality" (11N or 99.99999999 per cent purity).

**PES:** What's your on-the-ground assessment of the state of the sector at the moment?

**BW:** Today, the polysilicon industry is facing the result of rapid global capacity expansions over a short period until early 2011, with polysilicon prices decreasing from previously elevated levels, therefore leaving many incumbent producers with the challenge to swiftly reduce cost in order to preserve their margins. In the medium to long term, the market for Poly is expected to grow rapidly beyond current levels. The demand for significant future capacities is expected to come from the USA, the Middle East, or still Asia (China), based on a demand for clean power, a desire to "own" the technology often in its entirety from Poly to Module and resources necessary to meet their rapidly developing energy needs, adapt technology and profit from favourable framing conditions (sunshine, low energy and labour costs). Based on the achieved cost levels, Poly will remain the dominant raw material for the PV industry and is likely to profit significantly from continuous growth of solar energy on the one side and further technology developments on the other side.

**PES:** How has Schmid Silicon Technology been affected by the economic situation in Europe? What challenges have you faced?

**BW:** The market for future investments, be it in upgrades for higher quality and lower cost or new – often integrated investments in polysilicon manufacturing, despite the leading position in PV installations, is not necessarily in Europe and the economic situation there has therefore not impacted Schmid Silicon Technology significantly with respect to the contacts looking to invest in polysilicon technology. The overall development in the solar industry originating from the overcapacity – mainly in low to medium quality products - generated predominantly in China however

has basically put a stop to many planned new investments in polysilicon production facilities.

Schmid Silicon Technology is a relative newcomer in the polysilicon business despite the long and successful track record demonstrated by the Schmid Group in total in the PV industry. With respect to the cost and quality advantages that the monosilane based polysilicon process by Schmid Silicon Technology offers, the expectation is nevertheless, that, with the need to invest in plant up-grades and with the next round of investments when the demand growth has compensated the surplus capacity installed today, Schmid Silicon Technology will take a major share in the upcoming business opportunities. As a potential producer of monosilane and polysilicon from the production plant SPP the company has on the other hand indeed suffered as others have, since the market in Europe for these products has basically disappeared not least due to the general economic situation. Whilst for monosilane at least prices are expected to rebound next year, the current situation remains gloomy.

**PES:** Quality standards at the materials level are vital to the long-term success of the industry. Are we doing enough to ensure these standards are adhered to?

**BW:** Pressure on prices will lead to severe competition among polysilicon suppliers. Those without many years of manufacturing experience and those equipped with old systems run the risk of unprofitable, low quality production. Suppliers will have to switch to state-of-the-art, easy to run technology to remain competitive. Governmental regulations setting efficiency targets, reduced incentives and the



in its November 2011 Solar Sector Model estimated an undersupply of high-grade polysilicon of about 42 per cent in 2011, and 33 per cent in 2012. This gap roughly equates to over 60.000 Mt/a of high quality material that is not available in the market, and is filled with lower quality grades. The production technology currently installed and employed by incumbent producers does not offer the opportunities for a significant decrease in production cost. High quality product still finds its market and achieves a better price.

Low quality producers have had to shut down their facilities as they could not meet their customers' quality expectations or could not produce at the cost level that has been reached in the low quality part of the market. The Market has turned from a supplier's to a buyer's market and quality at competitive price levels is the distinctive factor to stay in business.

**PES:** What particular benefits does your unique SST Hydrochlorination Technology offer?

**BW:** By being able to operate at minimum process parameters, the plant perfectly demonstrates its value for customers having to cope with the present volatile market conditions: the SST hydrochlorination is a low pressure system providing many advantages with regard to operation, safety and costs compared to conventional high pressure systems.

**PES:** We saw you at Inter Solar this year. Is Europe a prime market for your company?

**BW:** Interestingly, the stronger interest comes from regions like MENA where one would expect that power generation with solar power is not high on the agenda due to ample availability of fossil fuels. These regions have however recognised that with the irradiation levels they enjoy their cost of generating power through PV systems can even today be met or even reduced by installation of integrated plants that optimise the synergies between the various steps in the value chain. On top they highly acknowledge the opportunity to make a lot more profit on selling their valuable fossil fuels on the market than wasting them for their captive power generation. For a



Monosilane-based, electronic grade polysilicon

availability of higher quality polysilicon from advanced technologies will have a strong impact on both the future polysilicon demand, as well as on the decision which technology to choose. The monosilane technology facilitates best in class cost and quality, future value enhancement and higher degrees of wafer, cell and module efficiencies.

**PES:** We note that the company has recently been certified by TÜV. What does this mean for you and your customers?

**BW:** The TÜV certified a 24.3 per cent conversion rate of the SPP hydrochlorination while running at minimum process parameters. This is an impressive

result and proves the technological capability of the Schmid Silicon Technology engineering team and enhances customer confidence in the company's performance level. It also acknowledges the know-how the SST team has gained, and continues to gain, its high level of expertise, by operating their own plant proving the value in the Schmid philosophy of generating a deep understanding of the technology the company offers.

**PES:** How have the quality demands of your customers changed over the years?

**BW:** Poly quality is becoming a major issue for high quality wafers, and is necessary for efficient cell concepts. Commerzbank has



Schmid Polysilicon Production SPP: production, competence and training centre

company like the Schmid Silicon Technology and its partner the Schmid Group who can jointly offer such integrated solutions and also provide significant innovation and cost down potential along the value chain in the years to come, this presents very interesting business prospects, whilst the technology, as it currently offers the best quality/cost balance available on the market can also be valuable for any European project.

**PES:** And conversely, how important is China to your operation?

**BW:** With the latest Five-Year-Plan the Chinese Government has not only set growth targets for their already leading polysilicon industry but has also established stringent quality and efficiency targets, which, with the currently installed equipment combined with only a few years of experience operating these plants cannot be achieved in the foreseeable future. A board of advisors to the Chinese Government, led by Prof. Shi Dinghuan, a former Minister and personal advisor to Prime Minister Wen Jiabao, has stated that “China needs innovative technology. SST Technology is an innovative technology.”

One of SST’s customers is the first Chinese company that after passing of the China

Law in early 2011 and the institution of the latest (12th) Five-Year-Plan in early 2012, has recently received central government approval for a polysilicon project. Another company that has signed a contract with SST in the meantime also has received approval by the government and intends to rely on SST technology to produce Float Zone quality polysilicon for the semiconductor industry.

In co-operation with an established EPC partner in China, a number of projects are under discussion as there is currently little trust in the capability of the suppliers of TCS-Siemens based polysilicon technology to meet the quality and cost targets established now.

**PES:** What are your thoughts about prospects for 2013 with regard to your organisation, and the solar/PV industry in general?

**BW:** We expect the market to come out of its consolidation phase which has helped significantly to achieve cost levels at or below grid parity in many regions of the world much earlier than anticipated.

In countries where electricity grids are well established Solar Energy will play its role as competitive as well as clean form of energy. In areas where grid availability is limited and people very often have no access to

power at all, cheap individual solar power based solutions will improve the quality of life significantly. No other form of power generation has the same potential for individual power system development. The current development of battery systems for small communities or larger size buildings or indeed smaller systems for the individual mini power stations will start to be available during 2013 and make solar power usage independent of the time of day. The potential is enormous and 2013 should see the start of the next upturn for solar power.

**PES:** What’s your take on the recent compromise on Feed-in Tariffs offered by the German government?

**BW:** Feed-in Tariffs have played a major and highly acknowledged role in getting the solar industry started. The current reductions are met by significant cost reductions with respect to the solar systems installed and certainly still offer the incentive they are intended to do. In the long term we expect that the PV industry will have to be competitive on its own and the foundations there fore already exist or will be there in the near future. In a recent article in the German daily newspaper TAZ (Solar gewinnt!, TAZ 10.08.2012, <http://www.taz.de/Debatte-Energiewende/!99319/>), Bernward Janzing has demonstrated how highly profitable solar power is even today and argues that the success of solar power in Germany cannot be stopped any more.

**PES:** What do you think is the greatest technical challenge, or set of challenges, facing our industry today? Why do you think these issues are so important?

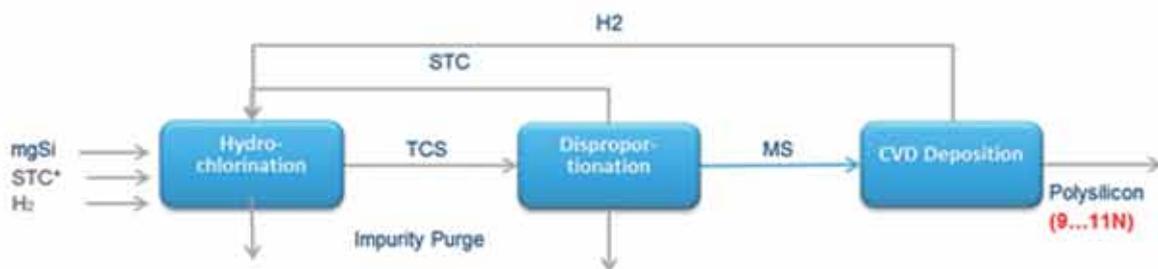
**BW:** The biggest issues in the industry remain the aforementioned quality and cost competitiveness together with energy storage solutions. The standard TCS-Siemens process for polysilicon production hardly provides any development and research potential for further significant cost reductions. Efficiency increases can be seen only in the downstream process with cell and module efficiency developments.

Grid parity and real competitiveness of the solar sector, however, will be besides an expected significant reduction in BOS cost be established by contributions from the upstream sector of polysilicon, ingot and wafer production with significant quality increases and strong cost competitiveness. The deposition process developed by SST is the only monosilane based high efficiency CVD system on the market. The Sun is the cheapest and despite the climate in Northern Europe mostly very reliable source of energy and without doubt the one to sustain best our environment. Together with upcoming energy storage solutions a clean power supply can be realised. ■

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### SAFE:

#### SST- Hydrochlorination

- ✓ Endothermic Process
- ✓ Lowest Pressure Hydrochlorination
- ✓ 27% mol

### PURE:

#### SST- Disproportionation

- ✓ Base for >10 N Poly-Purity
- ✓ Base for Monosilane Production Option
- ✓ No complex Distillation required

### Economical:

#### SST- MS-Deposition

- ✓ 50% Energy Savings
- ✓ 86% Monosilane to Polysilicon Conversion
- ✓ No vent gas recovery required

## SST-Polysilicon Technology: The Clever Way to Polysilicon