

Coatings on the move



Alanod has recently begun cutting its absorber material on a new cut-to-length system.

Photo: Alanod

Some are preparing for Asia, while others are gearing up towards concentrator collectors – due to the weak European flat-plate collector market, the coaters of solar absorbers are investing in far-away markets and new applications.

At BlueTec they have known for ages how to write “highly selective” in Chinese characters, in order to be able to show Asians one of the advantages of their absorber coating Eta plus. The German company had already put a Chinese version of their internet site on the web shortly after the company was founded in 2005. It was a clever decision; the Chinese collector market has brought above average development in the last few years for the coating company from near Marburg, Germany, and more than made up for the decline in crisis-struck export countries such as Greece, Italy, Portugal and Spain. Company head Davorin Pavic is certain that the Chinese BlueTec page will also attract customers in the future: “We continue to expect a good development of the Chinese market, as the flat-plate collector is becoming more and more important in China.”

Although vacuum tube collectors dominate the market in the giant Asiatic realm – after all, almost two-thirds of global solar thermal capacity is installed there – even a small market share for flat-plate collectors creates a big sales volume compared to the rest

of the world. In 2011, 2 of the 7 GW flat-plate collector total capacity was installed in China – so almost one third. Additionally, China has a growing solar thermal market. It is thus no surprise that Europe’s large coating companies are becoming ever more interested in the Asiatic market.

So too is Alanod. Together with the Taiwanese building materials manufacturer Xxentria Technology Materials, the aluminium refiner set up the joint venture Alanod-Xxentria Technology Materials on 1st January 2013, with its headquarters in Taiwan. Xxentria had just presented its new absorber coating Sungain for aluminium and copper substrates the previous year at the Intersolar Europe in Munich. Meanwhile the company has selectively coated stainless steel on offer as well. Alanod and Xxentria see the joint venture as an important step towards increasing the innovation and performance abilities of both companies in Asia, but they stress that the independence of the new company will be especially important for the Asiatic market.

Investing in coatings

Alanod has also invested at home. At its site in Ennepetal the company has begun operation of a new high-speed cut-to-length system. This can be used to cut the strip-ware with its highly sensitive surfaces as desired, then straighten and stack the plates. The 42 m long machine has an operating speed of 80 m/min, and the suction belt plate stacking unit can stack up to 160 plates per minute. “The new system gives Alanod a higher flexibility and guarantees our customers a quick processing and delivery of our products, which are in demand worldwide,” says Alanod CEO Ingo Beyer to explain the € 3 million investment.

The Finnish company Savo-Solar, on the other hand, has put work into a new coating. They thus now

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have a second absorber surface on offer, Memo 4, which has a slightly higher absorption level than the Memo layer introduced in 2011 (see table). The selective solar absorber coatings consist of three thin ceramic layers, which contain silicon, aluminium and titanium. The company uses two vacuum processes for the application of these: Physical Vapour Deposition (PVD) and Plasma-Enhanced Chemical vapour Deposition (PECVD). With a strip-coating process developed in-house, Savo-Solar can also apply an efficient surface to its new large absorbers, which use multi-chamber aluminium profiles with areas of 10 to 16 m².

Coating receiver tubes

Apart from a stronger export business with Asia, some coating companies hope for new business with concentrator solar thermal systems. They are sometimes involved in the development of new absorber tubes themselves. Almeco has developed a process with which it can bend its coated aluminium directly around a specially alloyed aluminium tube, without an insulating air gap forming between the absorber and tube surfaces. Almeco supplies its Tube 2.0 in various diameters and lengths of up to 6 m for concentrator collectors in the mid-temperature range of 150 to 220 °C. According to Almeco, they do not require a vacuum to reach their operating temperatures. Performance tests are currently being carried out for the company at the Institute for Thermodynamics and Thermal Engineering (ITW) in Stuttgart and at the Solar Technology Institute in Rapperswil, Switzerland.

The Swiss company Energie Solaire from Sierre in the Canton of Valais had already begun the setting up of a business field for selectively coated receiver tubes in parabolic trough collectors a few years ago. The company, which this year celebrates its fortieth anniversary, claims to be the only one in the world which can selectively coat stainless steel tubes of various diameters. "Our unique AS coating enables us to run the concentrator systems at ambient atmosphere temperatures of up to 300 °C and thus not require expensive vacuum technology," explains sales director Bernard Thissen. Energie Solaire uses a galvanising process to apply the selective coating based on black chrome to the stainless steel tubes. Numerous systems using these are already in use both nationally and internationally.

The US-American company Solec-Solar Energy also offers its coating for concentrator solar thermal systems. The solar paint Solkote HI/SORB-II has recently started to help the Fresnel collectors by Areva Solar to become more efficient. The subsidiary of the French nuclear power company Areva is currently using it



BlueTec supplies its selective absorber bands to as far away as China.

Photo: nagels-dahlmeier.de

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Manufacturers of absorber coatings

| Manufacturer | Product name | Start of production | Absorptivity [%] | Emissivity [%] | Coating | Coating process | Absorber plate material | Absorber plate thickness [mm] | Absorber plate width [mm] |
|--|--------------------|---------------------|---------------------|---------------------|-------------------------------|-------------------|--------------------------------|-------------------------------|---------------------------|
| Alanod GmbH & Co. KG, Germany | Mirotherm | 2001 | 95 ± 1 | 5 ± 2 | ceramic-metal-structure | PVD | aluminium | 0.3 to 0.8 | max. 1,250 |
| | Mirosol TS | 2010 | 90 ± 2 | 20 ± 3 | selective nano-composite | band lacquering | aluminium | 0.3 to 0.5 | |
| | Sunselect | 1997 | 95 ± 2 | 5 ± 2 | ceramic-metal-structure | PVD | copper | 0.12 to 0.5 | |
| Alanod-Xxentria Technology Materials Co., Taiwan | Sungain Al | 2012 | 95 ± 2 | 5 ± 2 | ceramic-metal-structure | PVD | aluminium | 0.3 to 0.6 | max. 1,250 |
| | Sungain Cu | | | | | | copper | 0.12 to 0.5 | |
| | Sungain SS | | | | | | stainless steel | 0.3 to 0.5 | |
| Almeco GmbH, Germany/Italy | TiNOX Energy Al | 2008 | 95 ± 2 | 4 ± 2 | ceramic-metal-structure | PVD | aluminium | 0.3 to 0.75 | max. 1,250 |
| | TiNOX Energy Cu | 2008 | 95 ± 2 | 4 ± 2 | ceramic-metal-structure | PVD | copper | 0.12 to 0.5 | |
| | TiNOX Artline | 2011 | 90 ± 2 | 5 ± 2 | ceramic-metal-structure | PVD | aluminium | 0.3 to 0.75 | |
| | TiNOX Nano | 2011 | 90 ± 2 | 5 ± 2 | ceramic-metal-structure | PVD | aluminium copper | 0.3 to 0.75 0.12 to 0.5 | |
| Alternate Energy Technologies, LLC., USA | Crystal Clear | 1995 | 97 ± 2 | 7 ± 2 | bimetallic alloy | galvanic | copper, stainless steel, steel | 0.2 | 90 to 152 |
| Arceo, Belgium | Solarceo | 2009 | 95 ± 2 | 5 ± 2 | ceramic-metal-structure | PVD | aluminium | 0.3 to 1 | max. 1,250 |
| | | | | | | | copper | 0.18 to 0.2 | max. 1,300 |
| BlueTec GmbH & Co. KG, Germany | Eta plus Al | 2005 | 95 ± 2 | 5 ± 2 | ceramic-metal-structure | PVD | aluminium | 0.3 to 0.5 | max. 1,250 |
| | Eta plus Cu | 2005 | 95 ± 2 | 5 ± 2 | ceramic-metal-structure | PVD | copper | 0.12 to 0.5 | max. 1,300 |
| Energie Solaire SA, Switzerland | AS ¹ | 1980 | 96 | 15 | black chrome | galvanic | stainless steel | 0.4 to 6 ² | max. 1,000 |
| | AS+ | 1998 | 95 | 5 | | | | | |
| Materials Technology Inc., USA | Krosol | 1977 | 95 ± 2 | 8 ± 2 | black chrome | galvanic | copper | 0.12 to 0.3 | max. 1,200 |
| S-Solar AB, Sweden | Sunstrip | 2001 | 96 ± 2 | 7 ± 2 | ceramic-metal-structure | PVD | aluminium | 0.5 | 70 to 143 |
| Savo-Solar Oy, Finland | Memo | 2011 | 96 ± 2 | 5 ± 2 | TiAlSiN/NO + SiO _x | PVD + PECVD | aluminium, copper | 0.3 to 65 ² | max. 3,000 ³ |
| | Memo 4 | 2013 | 97 ± 1 | 5 ± 2 | | | | | |
| Solec-Solar Energy Corp., USA | Solkote HI/Sorb-II | 1982 | 90 ± 2 ⁴ | 25 ± 5 ⁴ | silicone/calcined oxide | spray-application | metals, plastics, masonry | any | any |
| Viessmann Werke GmbH & Co., Germany | n/a ⁵ | 2009 | 95 ± 1 | 5 ± 1 | ceramic-metal-structure | PVD | aluminium | 0.4 | max. 1,000 |

¹ The AS coating can also be used in coverless absorbers; ² coating of entire, full-flow absorbers; ³ max. absorber plate length: 6,000 mm; ⁴ dependent of thickness and substrate; ⁵ Viessmann only coats its own absorbers.

Source: company data



Using its own system, Savo-Solar has applied a selective coating to this 14 m² absorber of multi-chamber aluminium profiles.

Photo: Savo-Solar

at solar thermal power plants in Australia and India. With the solar paint, which is sprayed onto the relevant areas, Solec claims that temperatures of over 500 °C can be achieved. Solec head Robert Aresty stresses the low level of investment required to apply the solar paint over using large vacuum strip-coating machines. The investment is limited to the spraying equipment and a protection cabin. Solec sells its solar paint in over 30 countries. China is to join these ranks soon and Aresty will have to find out about using the right Chinese characters. *Joachim Berner*