



# “TOTAL PLASTIC SOLUTION” FOR SOLAR ENERGY

Hanspeter Müller, Market Segment Manager Microelectronics, GF Piping Systems, Schaffhausen, Switzerland

It is universally recognized that electricity from solar cells is a major element in preventing global climate change. In photovoltaic systems all the necessary media have to be transported cleanly and safely. The optimal conditions are created by the “Total Plastic Solution” from GF Piping Systems.



← Ultrapure water circulation in photovoltaic production, equipped with PVDF pipes and valves from GF Piping Systems.

→ Production line for thin-film cells.



Energy produced by means of photovoltaics has doubled every two years since 2002 and at the end of 2008 14,700 megawatts of power were generated via photovoltaics worldwide.

The mass-produced, silicon-based, multicrystalline solar panels (c-Si) currently achieve an efficiency rate of approximately 15 percent. But already new and improved products are hitting the market – for example, the high-performance cells made of monocrystalline silicon or the so-called HIT (Heterojunction with Intrinsic Thin layer) cells. Both products have an efficiency of approximately 22 percent.

Besides conventional cell manufacturing (c-Si), the production of thin-film cells with efficiency rates of approximately 8 percent (a- $\mu$ c-Si, CIS, CdTe) is developing very dynamically as well.

#### Plastic solutions are economical and safe

The silicon wafers used in conventional photovoltaic production, wafers measuring 150 x 150 millimeters, sawed out of a polycrystalline silicon ingot, are etched on the surface and cleaned in complex wet processes. Diverse acids, as well as oxidizing chemicals, alkalis and inorganic salts are used in these processes. Added to which are various mixtures of these chemicals and water in diverse qualities, such as distilled, deion-

ized, demineralized or ultrapure. Among the acids used are e.g. hydrofluoric acid, sulfuric acid, nitric acid, phosphoric acid or acetic acid. Due to the highly corrosive nature of many of these media and compounds, metal piping is generally not used in these areas. Only a few precious metals, high-alloy steels or special nonferrous alloys would be suitable. Pipes made of platinum or gold are obviously not realistic, alloys are generally very expensive and often not very durable. Saline solutions can cause corrosion on pipes made of metal. High conductivity and the formation of galvanic elements are ultimately responsible for the dreaded pitting corrosion. Plastics, on the other hand, are practically predestined for such uses, also because they are more economical and easier to process.

#### Individual differences taken into consideration

Depending on the type of chemicals and their concentration, the actual application conditions, i.e. pressure, temperature or other environmental variables, the decision to use plastics must be made on an individual basis. Not only do the pipes have to be suitable for the respective application, but so do the joining elements, the seals, the valves and the measurement instruments. For most standard applications, decisions in this regard can be made quickly and

clearly. It becomes more difficult for the more complex applications or in borderline cases. Here, the performance of a system must be calculated, planned and expressed precisely in terms of the expected lifetime of the piping system.

For the rapidly growing technology of thin-film production, the leading manufacturers rely on SYGEF and PROGEF systems from GF Piping Systems for the supply of deionized water and on PE piping in large diameters, e.g. for conducting cooling media away from the coating lines.

For more information, please see our SYGEF and PROGEF brochures [www.piping.georgfischer.com](http://www.piping.georgfischer.com)  
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