

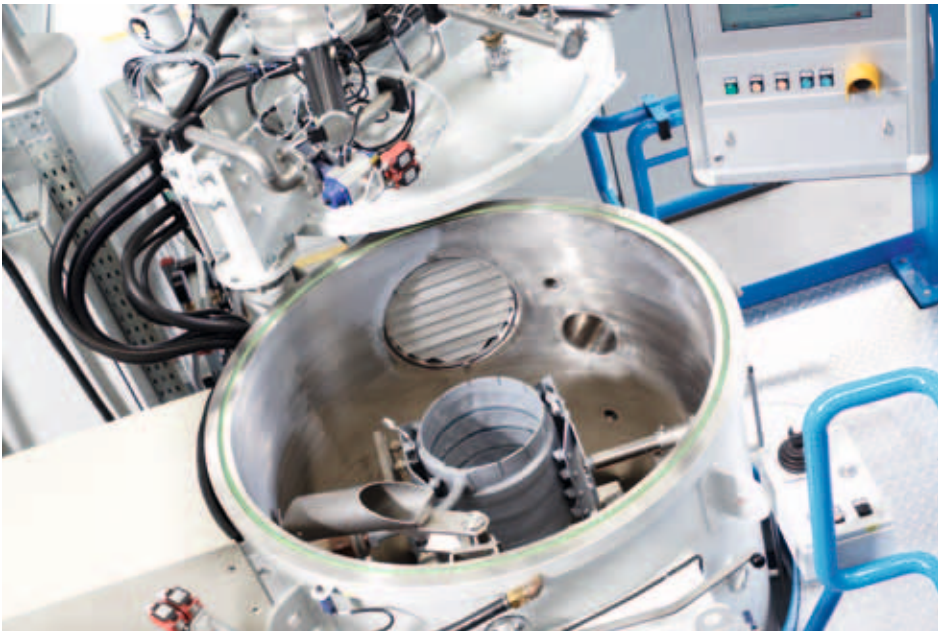
Be equipped for tomorrow's materials

The PVA TePla Group

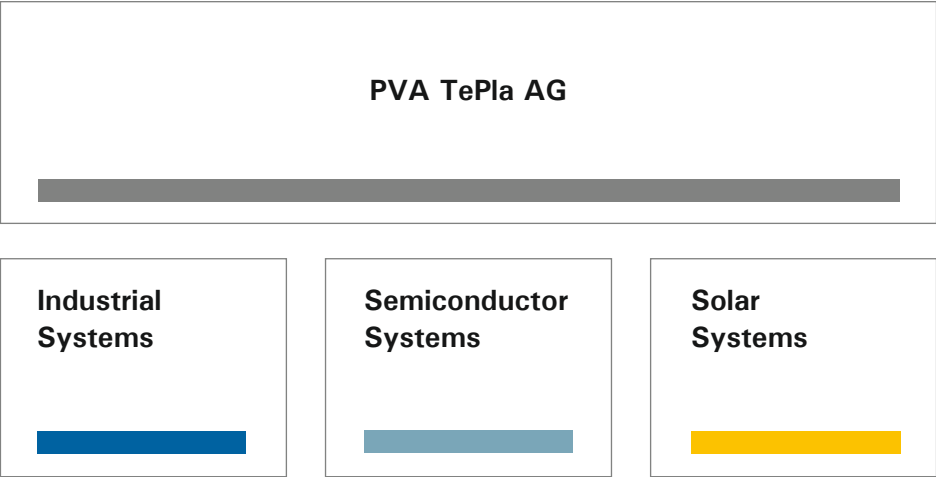
The companies of the PVA TePla Group develop and manufacture systems and components serving a broad range of markets globally for the treatment and finishing of high value materials and surfaces. The necessary processes take place mainly under:

Vacuum	High temperatures	Pressure	Plasma
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PVA TePla AG together with its subsidiaries is a key player in the world for hard metal sintering systems, crystal-growing systems and plasma systems used for surface activation and ultra-fine cleaning. The equipment and services of PVA TePla enable important manufacturing processes and technological developments, primarily in the promising semiconductor, hard metal, electrical/electronic and optical industries – as well as in the areas of energy, communication, photovoltaic and environmental technology.



The Divisions



Equipment for treating and refining materials are manufactured in the [Industrial Systems](#) division. In vacuum, under controlled inert or in a reactive gas atmosphere with partial and high pressure or in plasma, the properties of the materials can be improved, their shape can be changed and parts of different materials can be brazed or diffusion bonded to each other.

In the [Semiconductor Systems](#) division, PVA TePla offers a range of innovative high-tech equipment: systems for the production of silicon crystals for the semiconductor and optoelectronic industry, systems for plasma treatment of semiconductor devices and components and solutions for nondestructive quality inspection for materials and components using ultrasound, infrared lasers and chemical etching.

In the [Solar Systems](#) division advanced crystallization and auxiliary equipment is provided for manufacturing of both mono and multi crystalline ingots. Competitive costs of ownership, product customization and extended service and support are the key to the success of leading customers and partners in Photovoltaics.

Industrial Systems

Vacuum Systems

In the Vacuum Systems business unit, PVA TePla AG specializes in the design and construction of thermal systems developing, manufacturing and treating high-quality materials at high temperatures. With more than 50 years' experience and an equipment install base of over 1,000 systems, the company is a global market leader especially for vacuum and pressure sintering systems.

Sintering – in Vacuum and Pressure

The vacuum sintering systems and the pressure sintering systems are designed for all applications relating to debinding and vacuum sintering, and the pressure sintering systems are designed for subsequent isostatic pressing of powders from metals, carbides, alloys and ceramics under vacuum, inert or active gas atmosphere and high gas pressure of up to 100 bar.

High Temperature Graphite Heat Treatment

High value engineered components made of graphite or graphite-compounds (CFC) are purified, graphitized, infiltrated or coated under high temperatures in excess of 2,000 °C and vacuum or reactive gases for its use in semiconductor or photovoltaic production systems, automotive, aerospace applications and optoelectronics.

Brazing and Diffusion Bonding

Use of these advanced joining methods is often an essential part of the manufacture of complex components, including those made from highly contrasting materials. These processes enable the utmost precision, purity and accuracy of the connections.

Melting and Casting

The vacuum melting and casting systems can be used for all applications in inductive melting of metals and special alloys under high vacuum and inert gas, e.g. in materials development (R&D), purification and moulded cast of precious metals or precision casting of e.g. turbine parts.



Heat Treatment and Special Systems

Our vacuum systems are individually designed for a wide variety of processes in accordance with customer requirements. In addition, to the above-mentioned processes, these include reduction, carburizing, cleaning, tempering, degassing, coating, granulation, distillation, impregnation and drying.

Systems for PulsPlasma® Nitriding and Plasma Activation

Our subsidiary PlaTeG GmbH develops and produces plasma systems for a wide range of industrial applications.

Systems for PulsPlasma® Nitriding

PulsPlasma® nitriding is a thermo-chemical heat treatment for the creation of hardened and wear resistant Iron-nitride layers on steel surfaces. It is used for surface treatment of steel workpieces for wear protection. We develop and manufacture PulsPlasma® nitriding units in all sizes from small laboratory units to standard units for hardening shops up to large custom units for the treatment of large tools and gears with chamber diameters > 4.3 m.

Plasma Activation/Plasma Polymerization Systems

Plasma activation is used to increase the surface energy of glass, ceramics and plastics for better bonding, painting or printing properties. In plasma polymerization, hydrophilic or hydrophobic layers are produced to reduce friction or to protect against corrosion.

Plasma Sterilization Systems

With plasma sterilization, medical durables and consumables are sterilized in a gentle, environmentally sound and energy-efficient manner.



Semiconductor Systems

Crystal Growing Systems

PVA TePla is a key equipment supplier for the semiconductor industry. The company offers all industrially relevant methods for crystal growth, particularly for monocrystalline silicon crystals.

Crucible-Pulling-from-the-melt-Method (Czochralski-Cz) – EKZ Type

We offer Cz-systems for pulling silicon and germanium crystals for wafer manufacture for the semiconductor industry. Equipment for the growth of crystal diameters of up to 450 mm are available.

Vertical Gradient Freeze (VGF) Method – Kronos Type

For compound semiconductors in the optoelectronic industry and for high-frequency applications, we offer high-pressure VGF systems for crystal manufacture (gallium arsenide [GaAs] and indium phosphide [InP]).

Floatzone (FZ) Method – FZ Type

With systems using this method, high-purity monocrystalline materials are produced according to the "FZ-method". These crystals are used in the high-performance electronics sector and polysilicon production. Several variations of the equipment are available for a wide range of applications.

Silicon Carbide (SiC) Crystallisation by HTCVD/HTCVT Method – SiCube Type

SiC-crystals produced in the SiCube are needed in high-technology market areas. Typical applications are the high power electronics and optoelectronics, where specific properties of the SiC material, like high thermal conductivity, are crucial.



Plasma Systems

Low-pressure plasma systems for customer-specific solutions are designed and manufactured by this business unit. With gas plasma, surfaces can be functionalized on a nano-scale level or cleaned with excellent precision. Without the use of environmentally unfriendly wet chemistries we offer our customers the entire range of atmospheric and low-pressure gas plasma technologies which utilize both microwave (Mw) and radio frequency (Rf) excitation for the following markets and applications:

Semiconductor

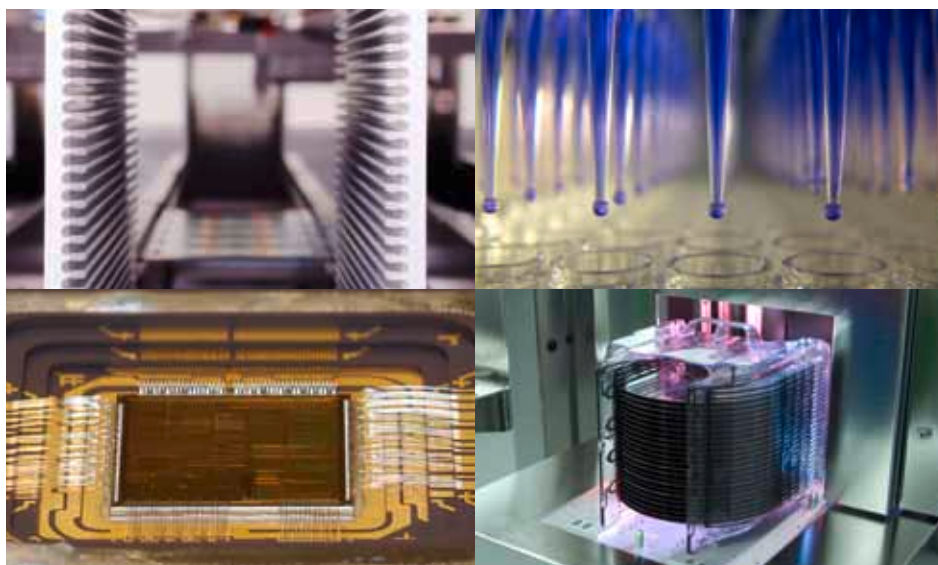
Our core competence in this area is the removal (ashing) and processing of photoresist masks for micro- and nano-structuring. We also offer similar process solutions for the MEMS sensor, high-brightness LED, OLED display and solar market. We offer a complete range of products in both batch and single-wafer configurations. In the Backend Chip Packaging, equipment for cleaning and activation as well as precise thinning of wafers (thickness <30 µm) are available for the next generation of high-performance devices in the advancing area of 3D interconnect technology.

Life Science

Both atmospheric and low-pressure gas plasma equipment is custom designed for critical cleaning, surface activation, modification and deposition of unique monomers. Our equipment serves the majority of the worlds leading medical device manufactures of both in-vivo and in-vitro devices used throughout the health-care and life science diagnostic industries.

Industry

Gas plasma is also used in a large number of industrial applications, e.g. in surface modification of plastics to improve adhesion before printing, painting and bonding.



Analytical Systems

By this business unit a number of measuring systems for nondestructive quality inspection with unique methods and analysis software is offered.

Laserbased Wafer Metrology Systems

These fully automated systems are capable of handling wafer sizes of up to 300 mm. The equipment is used for quality control in semiconductor production fabs globally in two main areas of application: for measuring critical shear stresses in silicon wafers, and for measuring the uniformity of ion implantation processes.

Acoustic Scanning Microscopes

Ultrasound electron scanning microscopes have a frequency ranges of 1 MHz – 2 GHz, offering the best resolutions available in the market today. The method enables nondestructive identification of defects in high-tech materials for the semiconductor and optoelectronic industry, e.g. for IC inspection and failure analysis, MEMS, bonded wafer structures, LEDs and also silicon ingots with a diameter of up to 450 mm. Newly developed methods also enable applications in medical research (imaging and analysis of cells) and the characterization of material parameters for solid state physics and material-analysis.

Vapour-Phase-Decomposition Systems

These innovative analytical systems are used to trace surface impurities on wafers for the semiconductor industry. In particular, metallic impurities can be found also in the production process with exceptional sensitivity and reproducibility. Fully automated systems that use VPD technology in conjunction with mass spectrometric-analytical procedures (ICP-MS) satisfy the strictest requirements with respect to determining the contamination level of wafers and microelectronic components.



Solar Systems

The Solar Systems division primarily builds crystallization equipment for silicon ingot manufacturing for solar cell application.

MonoCrystallizer - Czochralski (Cz) Method for Mono Crystal Ingots

Our crystallization equipment features advanced crystallization processes and offers our customers high yield and low cost materials.

MultiCrystallizer - Vertical Gradient Freeze (VGF) Method for Multi Crystal Ingots

The VGF-furnace features advanced process versatility for the casting of multicrystalline material. The equipment offers very high throughput and has been designed with the highest safety standards available today.

Integrated Solutions for Silicon Wafers

Crystallization equipment from PVA TePla can be supplied as an integrated solution featuring e.g. feeding of raw material, argon recycling, crucible loading and ingot removal systems, auxiliary equipment for thermal cracking of feedstock and recycled material etc. Together with associated industry partners we can offer all of our solar silicon equipment and software solutions as an integral part of a wafering turnkey line. PVA TePla offerings for solar silicon incorporate leading edge design and technologies providing our customers both rugged and highly reliable performance for manufacturing in the typical installation environment of solar wafer fabs.



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