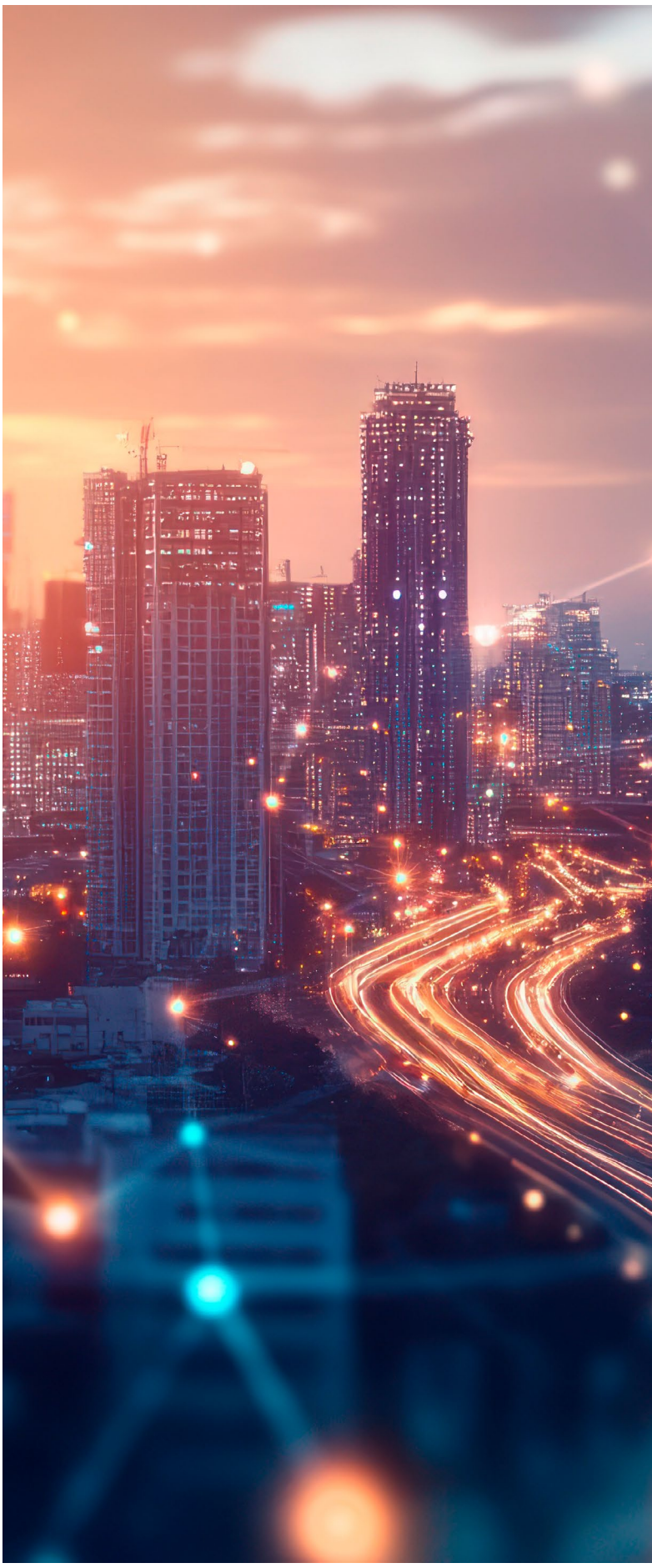
TECHNOLOGY PORTFOLIO

PVA GROUP

WE ENABLE PROGRESS IN METROLOGY AND MATERIAL SOLUTIONS

PVA TePla



TECHNOLOGIES OF TOMORROW. SHAPED TODAY.

Dear Reader,

the world is changing – faster than ever before. New materials, miniaturized structures, more powerful semiconductors, more reliable components for the energy transition: the demands on technology, precision and quality in our core industries are growing every day. This is exactly where PVA TePla is at home.

For over three decades, we have been developing and manufacturing high-tech systems at the forefront of these changes. We are not a company that watches trends – we actively shape them. Our systems are deployed in cleanrooms, research laboratories and production lines around the world: from semiconductor fabs in Asia to energy companies in Europe and the aerospace industry in North America.

What drives us is a clear ambition: to give our customers the decisive technological edge. We achieve this because we do not think of technology in isolation. In Metrology, we measure, inspect and characterize materials and components with the highest precision. In Material Solutions, we develop and manufacture equipment that enables the precise production and refinement of premium-grade materials. This unique combination makes us one of the most versatile technology providers for the industries of tomorrow.

This brochure gives you a comprehensive overview of our product portfolio. It addresses everyone looking for reliable, future-proof solutions. I invite you to explore our technologies – and I look forward to taking the next step together with you.

Jalin Ketter
CEO, PVA TePla AG

Headquarters
Wettenberg,
Germany

Keyfacts

Founded	1991
Headquarters	Wettenberg (Germany)
Stock Listing	SDAX & TecDAX (Ticker: TPE)
ISIN	DE0007461006
Employees	1,000+ (worldwide)

As a publicly listed company on the SDAX and TecDAX of the Frankfurt Stock Exchange, PVA TePla stands for transparency, reliability and a clear conviction: innovation is not an end in itself, but the key to measurable added value for our customers, partners and society.

PORTRAIT

PVA TEPLA AG
WHO ARE WE?

PVA TePla AG is an internationally leading high-tech company headquartered in Wettenberg, Germany. Since its founding in 1991, the Group has evolved from a specialist in vacuum metallurgy into a globally recognized provider of high-performance systems for the production, refining and analysis of advanced materials and components. Today, PVA TePla employs more than 1,000 people across subsidiaries and locations in Europe, the Americas and Asia – including the United States, China, Taiwan, Singapore and South Korea.

HIGHLY SPECIALIZED. GLOBALLY CONNECTED.

WHAT PVA TEPLA DOES

The company develops and manufactures high-tech systems across two business divisions: Metrology and Material Solutions. In Metrology, PVA TePla offers systems for inspecting materials and components using acoustic, optical and wet-chemical processes with a focus on the semiconductor industry. In Material Solutions, the company develops customized solutions for high-precision material production, refinement, and processing.

CORE INDUSTRIES AND APPLICATION FIELDS

PVA TePla systems are deployed in the world's most demanding industries:

Semiconductor
Precision systems for the production, inspection and characterization of wafers, power devices and 3D packages in semiconductor manufacturing.

Energy
Technologies for materials, components and production processes in energy applications – from power semiconductors to advanced materials.

Automotive
Inspection and material processing for power electronics, lightweight components and reliable parts used in electric and conventional vehicles.

Aerospace & Defense
Material processing, joining and non-destructive inspection for high strength, reliability and performance in demanding environments.

Medical
High-precision material processing and non-destructive inspection for medical components requiring exceptional quality, cleanliness and reliability.

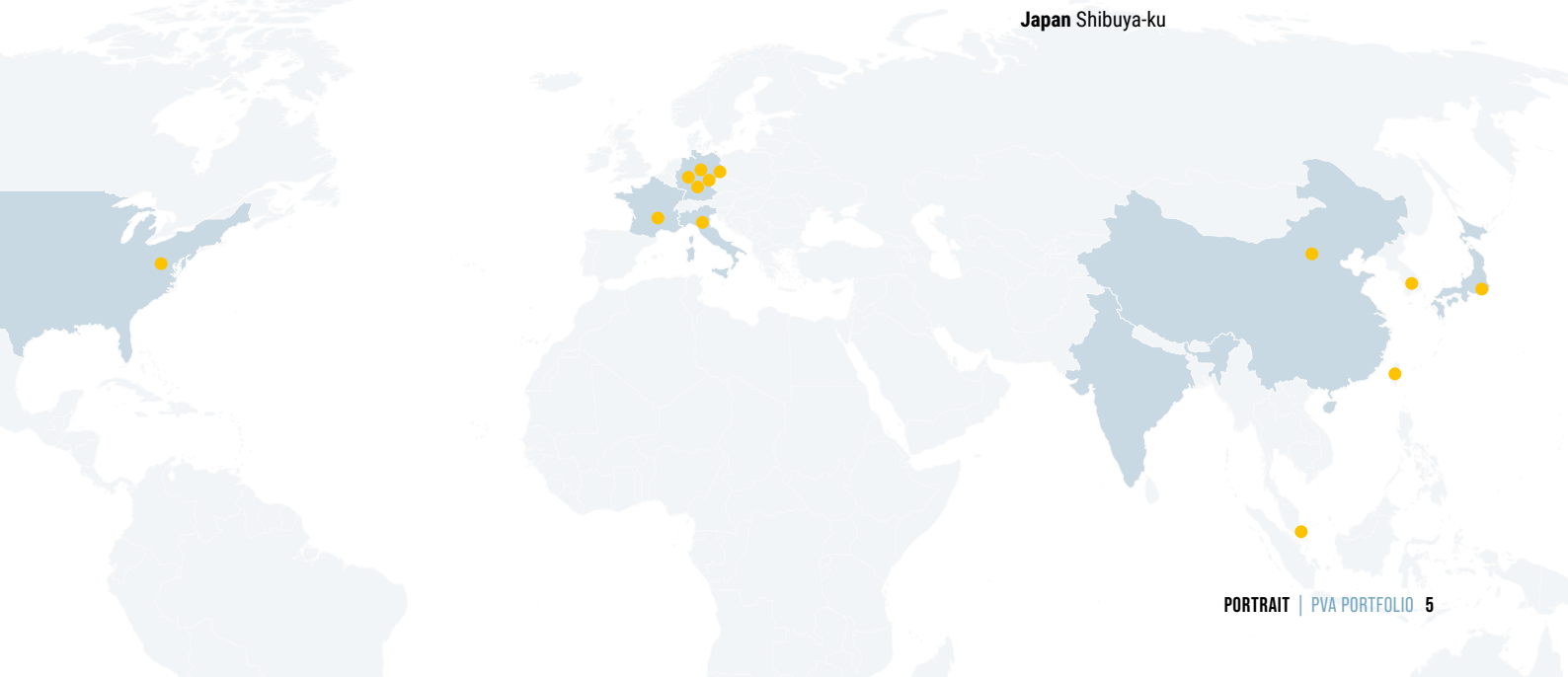
GLOBAL PRESENCE – LOCAL STRENGTH

With an international network of subsidiaries and service centers, PVA TePla is close to its customers – on every continent. This global footprint ensures fast response times, local application expertise and a comprehensive life-cycle service from project start to ongoing operation.

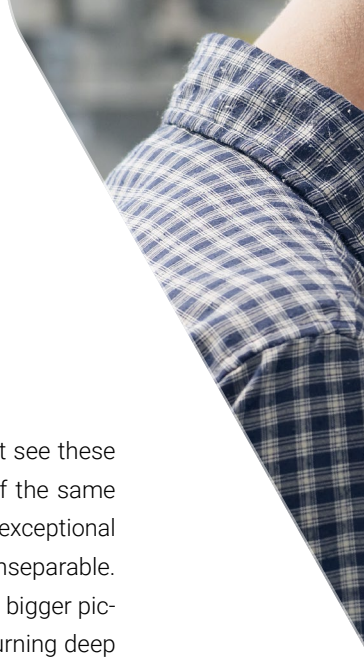
NORTH AMERICA
California Corona
Virginia Manassas
California Santa Clara

EUROPE
Germany Wettenberg | Westhausen | Jena | Radebeul
France La Chapelle d'Aurec
Italy Marano Vicentino

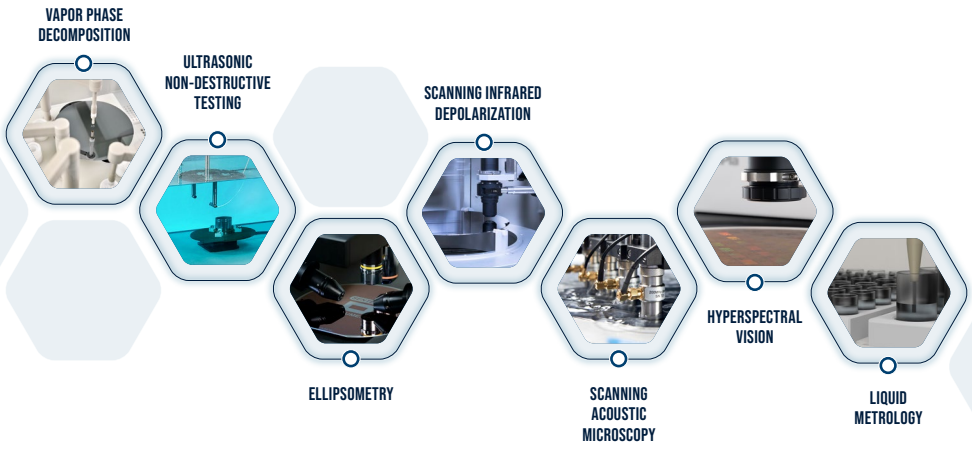
ASIA
China Beijing
Singapore
Taiwan Hsinchu City
Korea Hwaseong-si Gyeonggi-do
Japan Shibuya-ku

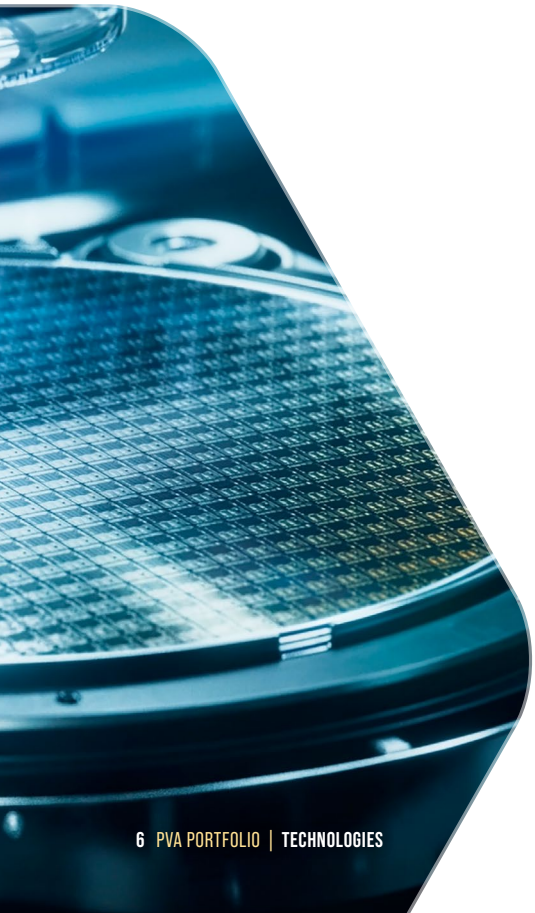


TWO DIVISIONS. ONE PURPOSE.
MASTERING THE MATERIALS OF TOMORROW.



Progress in semiconductors, energy, optics and materials science depends on one thing above all – control over the material itself. At PVA TePla, that conviction defines everything we do. Across our two divisions, Metrology and Material Solutions, we cover the full arc of the advanced-materials lifecycle: enabling the creation and refinement of materials under precisely engineered conditions, and advancing our understanding of them down to the smallest internal detail. We don't see these as separate businesses but as two halves of the same story – because equipping others to create an exceptional material and supporting them to prove it are inseparable. This is where our philosophy lives: seeing the bigger picture, connecting process and analysis, and turning deep material understanding into a decisive advantage for our customers.

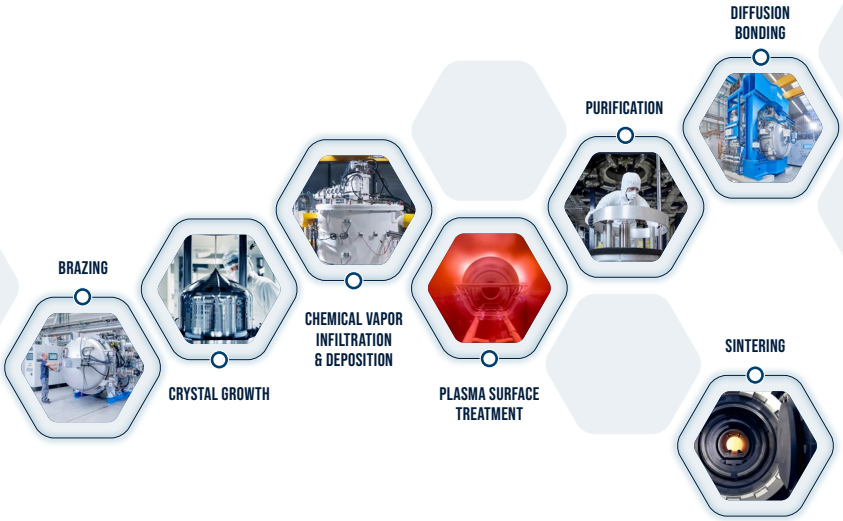




METROLOGY SYSTEMS
WHERE QUALITY BECOMES CERTAINTY.

Metrology Systems is where materials and components are understood – not assumed. Using non-destructive, high-precision inspection, we make the invisible measurable: internal defects, hidden interfaces, structural integrity and material properties that determine whether a product performs or fails in the field. Our systems deliver more than images; they deliver quantitative, reproducible data that turns inspection into a reliable basis for engineering and quality decisions. From single-sample analysis in the lab to fully automated inspection on the production line, our platforms scale with our customers' needs. In an era where the smallest hidden flaw can compromise an entire batch, we give our customers the certainty to ship with confidence.

TECHNOLOGY THAT DELIVERS.



MATERIAL SOLUTIONS
WHERE ADVANCED MATERIALS TAKE SHAPE.

Material Solutions transforms raw materials into high-performance engineered materials. Under precisely controlled temperature and process atmospheres, our systems grow crystals, join dissimilar materials into complex multi-material components and purify graphite to semiconductor-grade purity; enhanced by ceramic coatings that extend lifetime of graphite in demanding semiconductor applications. Complementary surface treatment processes further tailor material properties, enabling targeted modification of surface chemistry, adhesion, and functional performance.

Advanced equipment solutions with precise control over temperature, atmosphere, pressure, and many more parameters is decisive in unlocking the full potential of advanced materials. Our systems are engineered for the precision, reproducibility, and throughput that serial production demands – while retaining the flexibility required for cutting-edge research and development. By mastering the conditions in which materials are formed and refined, we help our customers accelerate the path from breakthrough to production – with quality engineered in from the very first step.

Metrology and Material Solutions – both divisions embody the PVA TePla AG commitment: Technology that delivers. Systems you can rely on. And a partner that thinks ahead.

YOU CAN'T IMPROVE WHAT YOU CAN'T MEASURE.

METROLOGY

In the semiconductor industry and related high-technology sectors, the quality of a material or component is often determined at the micrometer or nanometer level. Defects invisible to the naked eye can render entire production batches worthless. This is exactly where Metrology steps in: with high-resolution measurement and inspection systems that reveal irregularities in and on materials and components.

10 **Scanning Acoustic Microscopy**
High-resolution acoustic microscopy for internal defects in wafers and small components.
Automotive | Semiconductor | Medical | Energy

11 **Ultrasonic Non-Destructive Testing**
Ultrasonic testing of large industrial components for cracks, voids and delaminations.
Automotive | Semiconductor | Medical | Energy | Aerospace & Defense

12 **Scanning InfraRed Depolarization**
Detects mechanical stress in substrates without contact.
Semiconductor

13 **Hyperspectral Vision**
Analyzes surfaces optically across the full spectral range with precision.
Semiconductor | Medical | Energy | Aerospace & Defense

14 **Ellipsometry**
Measures thin-film thickness with the highest precision, fully non-destructively.
Semiconductor | Energy

15 **Vapor Phase Decomposition**
Enables trace chemical analysis of contaminants on wafers.
Semiconductor

16 **Liquid Metrology**
Monitors the chemical purity, concentration, and stability of liquid process chemicals.
Semiconductor

METROLOGY

SCANNING ACOUSTIC MICROSCOPY

From wafers and bonded interfaces to multilayer stacks and 3D structures: non-destructive subsurface inspection at micrometer resolution.

Scanning Acoustic Microscopy solutions enable non-destructive inspection of semiconductor wafers, packages, TSVs and advanced packaging assemblies. High-frequency ultrasound detects internal defects and interface anomalies such as delamination, voids and cracks that remain invisible to conventional optical and X-ray inspection. We provide leading technology from 5 MHz up to 1000 MHz for best defect detection, multi-array technology for enhanced throughput and special solutions for JEDEC tray inspection (Dynamic Through Scan). Real-time height compensation (HISA) enables perfect scan results on bowed samples, and DLIC (Dynamic Liquid Immersion Coupling) provides immersion protection for D2W/W2W wafer applications.

From failure analysis in R&D to automated inline inspection in volume production, SAM strengthens process control, improves yield and verifies product reliability.

- Wafer bonding & Direct Bond Interconnect (DBI) interface inspection
- HBM interface analysis, D2W and W2W inspection
- Advanced packaging and automated JEDEC tray inspection
- Flip-chip, BGA and TSV inspection
- MEMS & sensor devices, optoelectronic inspection (eutectic bonded interfaces)
- Power modules, IGBT and DCB inspection

High-resolution acoustic imaging
With application-specific transducer frequencies from 5 MHz to 1000 MHz

Improved yield & process control
Scalable from R&D to volume production

Automated non-destructive inline inspection
Detection of subsurface, volume and interface defects, on wafer, chip and panel level (micro voids, delaminations, cracks, and TSV defects)

PRODUCT FAMILY

SAM Auto Wafer | SAM Auto Tray | SAM Auto Panel | SAM Lab

MORE INFORMATION?
EXPLORE ONLINE!

METROLOGY

ULTRASONIC NON-DESTRUCTIVE TESTING

- Forgings, ingots, billets & pucks
- Large or curved parts (domes, cylindrical housings, turbine blades, wings)
- Metals, alloys & composites (welded, soldered & bonded joints)
- Composites (Multi-ply composites, Honeycomb)
- Wall-thickness & material characterization
- Solar panels & bus-bar bond inspection

Failure analysis ensures integrity. Scan the full volume of complex shaped metals, alloys and more, to find flaws during development or before the field.

Ultrasonic Non-Destructive Testing – including conventional and phased array methods – looks deep into solid, opaque components. A transducer sends pulses into the part; differences in acoustic impedance at internal boundaries reflect the sound back as measurable echoes, revealing flaws that optics cannot reach and X-ray often cannot contrast.

Whereas SAM images fine interfaces in thin, layered electronics at very high frequencies, Ultrasonic NDT operates at low, mid and high frequencies with multi-axes motion to scan the full volume of large, thick or complex geometries, including forgings, ingots, panels, domes, or contoured parts. Using A-, B- and C-scans, through-transmission and time-of-flight analysis, it detects inclusions, delaminations, voids, cracks and bond failures while mapping their exact location, size and depth for reliable quality assurance and failure analysis.

Inspect the whole part
Full-volume scanning, not just surface

Master any geometry
Multi-axis motion follows curved and complex shapes

Locate flaws exactly
Pinpoint size, depth and position for clear decisions

PRODUCT FAMILY

Multi-Axis INDUSTRIAL NDT | VUE SERIES

MORE INFORMATION?
EXPLORE ONLINE!

METROLOGY

SCANNING INFRARED DEPOLARIZATION

Internal stress, hidden defects, invisible growth signatures – SIRD reveals them all.

Scanning InfraRed Depolarization (SIRD) is a powerful metrology technology for the non-destructive analysis of stress and defects in semiconductor wafers. It exploits the photoelastic effect: as an infrared laser beam passes through the wafer, internal stress alters the polarization state of the light in a measurable way. By scanning this signal across the entire wafer surface, SIRD generates detailed maps of internal stress fields and reveals defects such as dislocations, slip lines, and growth-related signatures – features that may remain undetected by conventional optical or acoustic inspection methods. The technique can be applied to a broad range of semiconductor materials, including Si, SiC, GaN, GaAs, InP, and AlN.

SIRD supports quality assurance, process control, and failure analysis across the semiconductor value chain – from crystal growth and substrate qualification to epitaxial layer characterization and inline production monitoring. Solutions range from manual laboratory systems to fully automated, inline platforms.

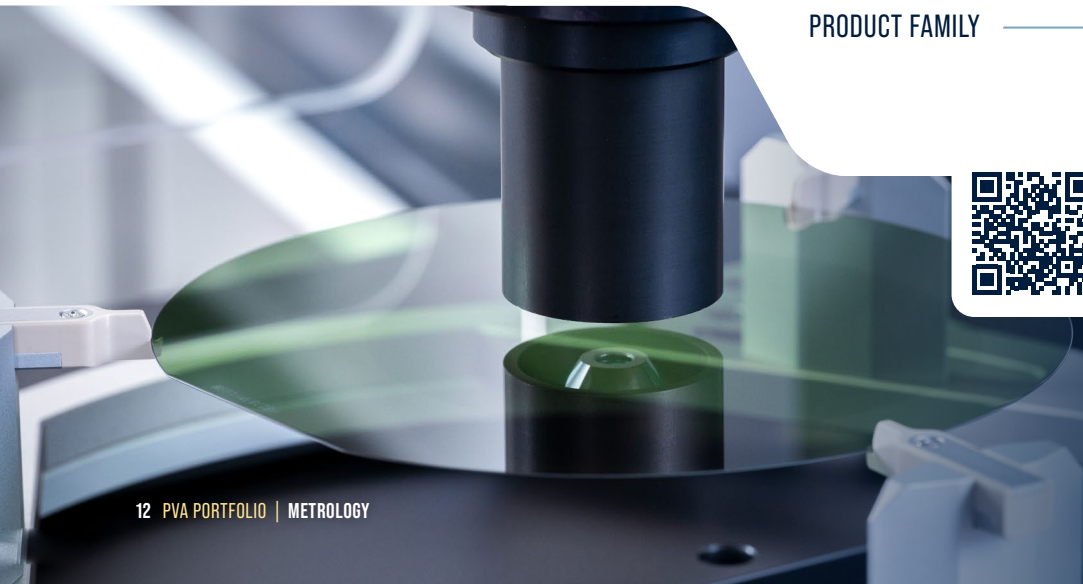
- Stress and defect inspection of Si, Al_2O_3, and glass substrates, as well as epitaxial wafers
- Evaluation of SiC, GaN, GaAs, InP & other compound semiconductors
- Process monitoring and early warning for process deviations

Turn stress into process control
Spot deviations early and fix them fast

Catch defects before they cost you
Identify critical stress and defects early

Built for the fab
Fully automated, SECS/GEM available

No damage, no loss
Fully contactless and non-destructive



PRODUCT FAMILY

SIRD

MORE INFORMATION?
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METROLOGY

HYPERSPECTRAL VISION

- Thin film thickness & uniformity inspection
- Surface contamination & cleanliness verification
- Coating integrity & layer defect detection
- Semiconductor wafer & PCB surface inspection
- Bipolar plate & fuel cell component inspection
- Aerospace, medical & industrial surface quality control

Invisible residues, uneven coatings, hidden defects – one hyperspectral scan captures them all, across the entire surface.

Hyperspectral Vision combines optical spectroscopy and imaging to inspect surfaces, thin films and coatings – fast, contactless and fully non-destructive. In a single scan, the system captures complete spectral information across the entire sample surface and translates it into spatially resolved maps of layer thickness, contamination, defects and surface condition. It covers 100% of the surface in one pass – without sampling, without damage, and without specialist expertise.

Hyperspectral Vision is used wherever surface and layer quality directly affects product performance: in semiconductor manufacturing, fuel cell and bipolar plate production, aerospace coating inspection, medical device quality control and PCB assembly verification.

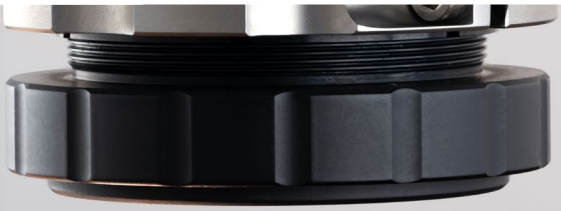
See the full picture
100 % surface coverage in one scan

Replace multiple methods with one scan
Covers what FT-IR, XPS, SEM and contact-angle each do separately

Non-destructive by design
No contact, no damage

PRODUCT FAMILY

VEpioneer | VEreveal | VEgauge | VEsolve PRO



MORE INFORMATION?
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METROLOGY

ELLIPSOMETRY

Layers too thin to see, stacks too complex to guess – ellipsometry measures them with precision, non-destructively.

Ellipsometry is a technology to measure how polarized light changes when it reflects from a surface. From this change, it derives film thicknesses down to the sub-nanometer range, refractive indices, extinction coefficients from single thin film to complex multilayer stacks – non-destructively, with exceptional accuracy. It is used wherever the precise control of thin films is critical to device performance: in frontend and backend semiconductor manufacturing, power electronics based on SiC and GaN, photovoltaics, and optical coating production. From gate oxides to passivation layers and buffer films, ellipsometry delivers the data needed to keep processes in spec and yields high – in R&D as well as high-volume manufacturing.

Control your process, not just your product
Reliable metrology data at every critical step

One measurement, many answers
Thickness, refractive index and material composition in one scan

Measure what you can't see
Sub-nanometer accuracy

No damage, no delays
Fully non-destructive

- Measurement of thickness and optical properties of thin films on semiconductor wafers
- Characterization of dielectrics, metals, and semiconductor layers
- Process control in development and high-volume manufacturing
- Thin film validation and material characterization

PRODUCT FAMILY

LuXpector THEA

MORE INFORMATION?
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METROLOGY

VAPOR PHASE DECOMPOSITION

- Silicon wafer surface contamination analysis
- Compound semiconductor inspection (SiC, GaAs, InP)
- Wafer bulk metal contamination detection
- Wafer edge & bevel contamination monitoring
- Process step cleanliness verification
- Contamination root-cause & source analysis

Zero tolerance for contamination – VPD delivers ultratrace metal detection at the wafer surface to catch defects before they reach the device.

Vapor Phase Decomposition is an established technique for ultra-trace analysis of metallic contamination on wafer surfaces and in the wafer bulk. The wafer surface is first exposed to a reactive gas phase that dissolves the native oxide layer; a scanning droplet then collects the contaminants directly, concentrating them for subsequent ICP-MS analysis.

The result is quantitative, element-specific contamination data at detection limits far below 10^6 atoms/cm² – well beyond what conventional surface analysis methods can achieve. VPD-ICP-MS is applied wherever wafer cleanliness is critical: in silicon wafer production, compound semiconductor manufacturing, and chip fabrication – supporting incoming inspection, process control, and contamination root-cause analysis.

Know exactly what and how much
Quantitative, element-specific results

Detect what others miss
Ultratrace sensitivity for metals at ppb and below

Stop contamination before it costs you
Early detection across all process steps

Scale without disruption
Modular design fits your workflow

PRODUCT FAMILY

WSPS (WAFER SURFACE PREPARATION SYSTEM)

WSMS (WAFER SURFACE MEASUREMENT SYSTEM)

MORE INFORMATION?
EXPLORE ONLINE!

LIQUID METROLOGY

Catch contamination, drift, and purity shifts – before they reach your wafer and cost you yield.

- (Wet)-process chemical purity monitoring and control
- Chemical material inspection and release
- Purity verification across production batches
- Ultrapure water, high-purity acids, and trace contaminant testing

Liquid Metrology monitors the chemical purity, concentration, and stability of liquid process chemicals through a controlled workflow from sample collection to result. The sample is collected from the process bath or supply line, prepared by dilution or conditioning, and analyzed by ICP-MS – delivering quantitative, element-specific contamination data at ultra-trace levels down to ppt.

The result is reliable, comparable data that makes small chemical changes visible before they affect process performance. Liquid Metrology is applied wherever chemical purity directly determines process outcomes: in semiconductor wet cleaning, CMP, electroplating, ultra-pure water monitoring, ultra-pure chemical production, and incoming chemical inspection – from stand-alone lab setups to fully integrated in-fab solutions.

Catch contamination before it reaches the wafer
Detect trace-level shifts early

Less manual work, more reliable results
Automated, operator-independent results

Full workflow in one system
From sample to data, no handoffs in between

Built for the cleanroom
ISO Class 3, SEMI S2, front-only access

PRODUCT FAMILY

LiquidPrep

MORE INFORMATION?
EXPLORE ONLINE!

DETECTION IS ONE HALF. PREVENTION IS THE OTHER.

Metrology quantifies material properties and defines the limits within which a component is compliant. Meeting these limits is a matter of process control. Material Solutions supplies the vacuum, plasma and high-temperature systems in which the required material states are produced.

WE DON'T
REFINE
MATERIALS.
WE REFINE
WHAT
REFINES
THEM.

MATERIAL SOLUTIONS

PVA TePla's Material Solutions division develops and delivers equipment solutions that enable the large-scale production of advanced materials – with precise process control, consistent reproducibility and industrial scalability.

CRYSTAL GROWTH

CZOCHRALSKI PROCESS

In the Czochralski process, high-purity polycrystalline silicon is melted in a quartz crucible under a controlled argon atmosphere. A rotating seed crystal is slowly pulled upward from the melt, drawing a cylindrical monocrystalline ingot behind it. Pulling speed, rotation, and thermal gradient are precisely controlled throughout to maintain constant diameter and crystal quality. The process supports large-diameter ingots and a wide range of doping profiles – making it the dominant substrate technology for semiconductor, power electronics, and photovoltaic applications worldwide.

- Si Substrates for logic and memory ICs
- Power Devices like low-voltage MOSFETs
- Germanium single crystals for IR optics and radiation detectors

Consistent wafer quality
Stable electrical properties, fewer rejects

Scalable to the largest diameters
Supports current and future fab requirements

PRODUCT FAMILY

CGS-LINE SC-LINE

FLOAT ZONE

In the Float Zone process, a polycrystalline silicon rod is melted contactlessly by a high-frequency induction coil. The molten zone travels through the rod and solidifies as a monocrystal guided by a seed crystal – without ever touching a crucible. This eliminates the oxygen contamination inherent to quartz crucible methods and reduces costs, as no single-use crucibles are required. Continuous gas-phase doping enables homogeneous resistivity distribution across the full crystal length. The result is ultra-high purity silicon for the most demanding high-frequency, power, and precision applications.

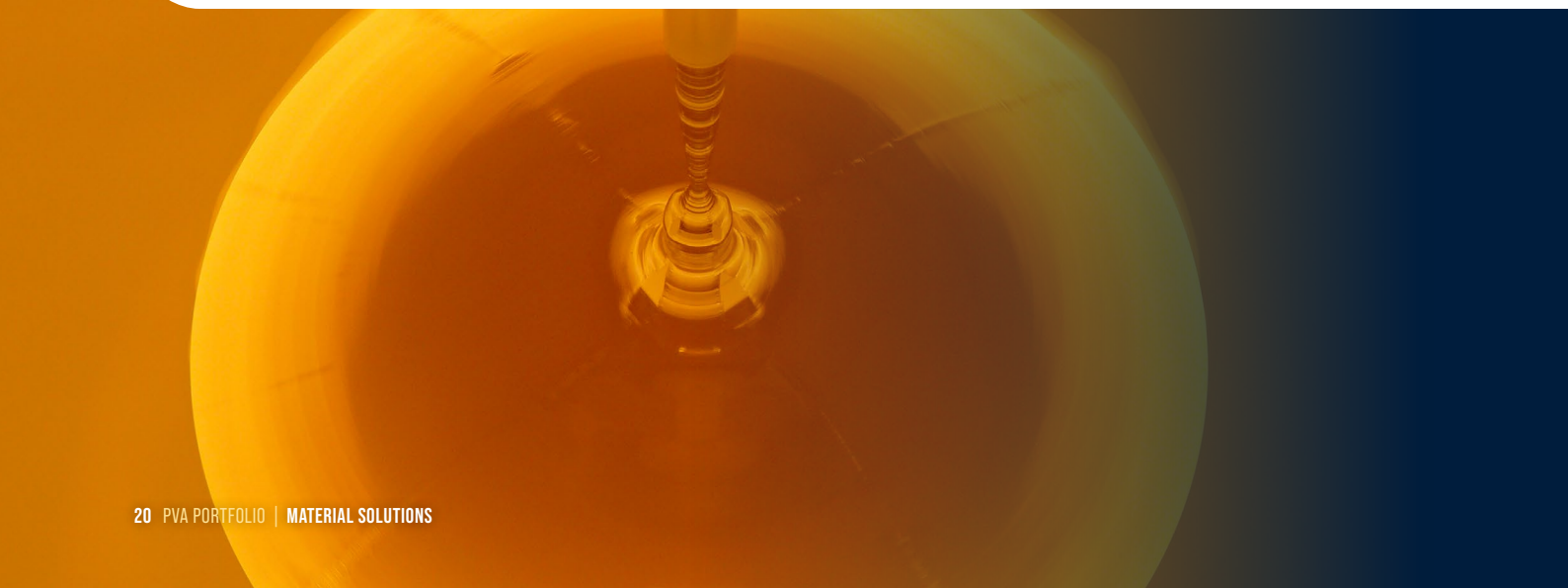
- High-resistivity silicon for power devices
- RF parts for base stations and radar
- Radiation detectors and germanium IR optics

Fewer device failures from material defects
Ultra-high purity reduces leakage currents and breakdown risk

Stable resistivity across the full crystal
Reliable electrical performance for every wafer

PRODUCT FAMILY

FZ-14 FZ-35



Whatever your material requires, there is a growth process for it – and we build it.

PHYSICAL VAPOR TRANSPORT

In Physical Vapor Transport, source material in powder form is sublimated at temperatures above 2,000°C inside a closed crucible. The resulting vapor travels along a temperature gradient toward a cooler seed crystal, where it condenses and deposits layer by layer into a monocrystalline boule. Precise control of temperature, pressure, and gas atmosphere is critical for crystal quality and process yield. High repeatability of these conditions – run to run and system to system – is what makes the difference between laboratory results and reliable industrial production.

- SiC for EV inverters and onboard chargers
- Fast charging and energy converters
- AlN and semi-insulating SiC for RF/LEDs

Reliable substrate quality at production scale
Repeatable crystal quality means fewer rejects and stable device yields

Future-ready substrate sizes
Supports the move to larger diameters as the SiC market scales

PRODUCT FAMILY

SiCma

VERTICAL GRADIENT FREEZE

In the Vertical Gradient Freeze process, starting material and a seed crystal are placed in a crucible and fully melted. A precisely controlled vertical temperature gradient then drives solidification from the bottom up – without any mechanical movement. The absence of moving parts reduces thermal turbulence and enables exceptionally pure, low-defect crystals with high uniformity. The process handles a broad range of compound semiconductors and operates at elevated pressures where required, making it suitable for materials with high vapor pressure that cannot be grown by conventional methods.

- GaAs and InP for high-frequency ICs
- LEDs, laser diodes, photodetectors
- CdTe/CZT imaging detectors, and optics

Stable electrical and optical properties
High uniformity from seed to crown, wafer to wafer

Enables materials other processes cannot handle
GaAs, InP, CdTe, sapphire, CaF_2 in a single platform

PRODUCT FAMILY

KRONOS

MORE INFORMATION?
EXPLORE ONLINE!

CHEMICAL VAPOR DEPOSITION AND INFILTRATION

Extreme temperatures, corrosive environments, structural loads beyond metal limits – gas-phase chemistry builds the materials that make it possible.

Chemical Vapor Deposition (CVD) and Chemical Vapor Infiltration (CVI) both use reactive gases at high temperatures to form high-purity ceramic materials – but serve different purposes. In CVD, gases react on a solid substrate surface, depositing dense ceramic coatings or free-standing monoliths with outstanding thermal, chemical and wear resistance.

In CVI, reactive gases penetrate deep into porous fiber preforms, depositing ceramic layers from the inside out to produce lightweight, high-strength ceramic matrix composites (CMC) such as C/C, C/SiC and SiC/SiC. Both processes offer precise control over temperature, pressure and gas composition, cover a wide range of materials and operate across temperatures from 500 to 2,200°C – from lab-scale reactors to large industrial systems.

One platform, many materials
SiC, TiC, BN, PyC, ZrC, HfC and more

Precise control, high purity
Temperature, pressure and gas composition tuned to your exact requirements

Materials built for extreme conditions
Ceramic coatings and composites stable far beyond metal limits

CVD

- SiC coating of graphite components for semiconductor manufacturing
- Thermal protection & wear-resistant coatings for aerospace & defense
- Cutting tool, infrared optics & biomedical implant coatings

CVI

- Aerospace turbine blades, valves & hot engine components
- SiC/SiC accident-tolerant fuel cladding for nuclear reactors
- Carbon-carbon brake systems & ceramic heat shields

PRODUCT FAMILY

CVD SYSTEMS | CVI SYSTEMS

MORE INFORMATION?
EXPLORE ONLINE!

MATERIAL SOLUTIONS

FLUIDIZED BED PROCESS

- TRISO nuclear fuel particle coating (SiC, PyC, ZrC, HfC)
- Solar-grade silicon granule production
- Battery anode material coating (graphite-silicon composites)
- Pyrolytic carbon coating of medical implants & heart valves
- Carbon nanotube production via catalytic CVD
- Small component coating immersed in the fluidized bed

Uneven coatings, limited throughput, poor gas-solid contact – fluidized bed reactors coat particulate materials uniformly at high throughput.

The Fluidized Bed Process applies Chemical Vapor Deposition to particulate materials and powders. A high-velocity gas stream flows upward through a granular solid, suspending the particles so the bed behaves like a fluid. This fluidized state ensures that every particle is continuously exposed to the reactive gas – resulting in outstanding temperature uniformity, high gas dissociation and highly uniform coating deposition across the entire particle surface.

Reactors operate in batch mode or with continuous material feeding and removal, across a wide range of crucible dimensions and temperatures up to 2,000°C. The process coats powders, granules and small components with materials including SiC, ZrC, HfC and PyC.

Uniform coating on every particle
Fluidized state ensures full gas-solid contact across the entire batch

High throughput, consistent quality
Isothermal operation and high heat transfer rates for reproducible results

Flexible for batch/continuous production
Adapt to your process – from lab scale to industrial continuous operation

A wide coating material range
SiC, ZrC, HfC, PyC and more – one platform, many applications

PRODUCT FAMILY

FLUIDIZED BED REACTOR

MORE INFORMATION?
EXPLORE ONLINE!

MATERIAL SOLUTIONS

HIGH PRESSURE VACUUM SINTERING

Residual pores, density gaps, binder residues – the combined Sinter-HIP-process eliminates material defects and delivers hardmetal at its best.

High pressure sintering combines three process steps in a single furnace run: debinding, vacuum sintering, and hot isostatic densification under pressurized inert gas of up to 100 bar. During sintering, powder particles fuse at grain boundaries to form a dense body while gases and impurities are removed.

The subsequent pressure phase closes any remaining pores isostatically – resulting in material densities and mechanical properties that conventional vacuum sintering alone cannot achieve. Rapid cooling systems then minimize cycle times and maximize throughput. The technology is used wherever hard metals, cemented carbides, or technical ceramics must meet the highest demands on density, strength, and surface quality.

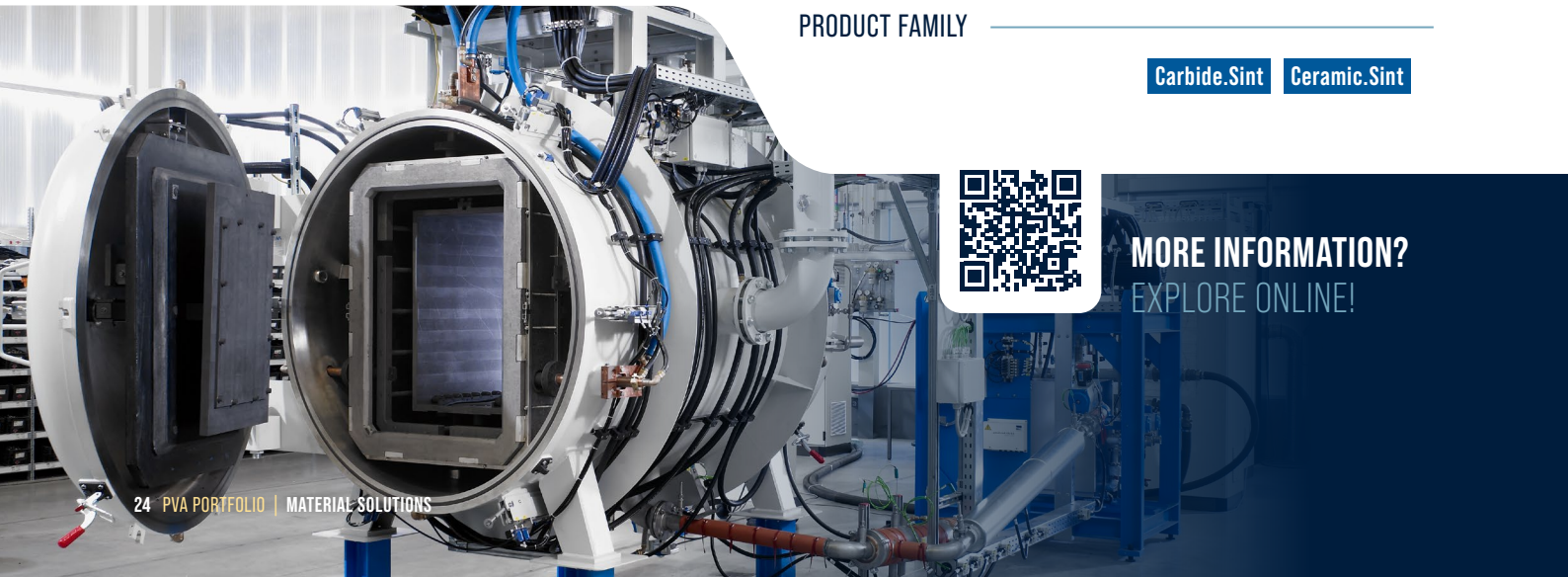
- Cutting tools for multiple material processing
- Wear parts for mining & heavy industry
- Si_3N_4 ceramic substrates for power electronics
- Automotive components (nozzles, valve seats, gears)
- Aerospace & defense hard metal components
- Drills and mills of any size, e.g. for AI-PCBs

Maximum density in a single run
Debinding, sintering and HIP combined

Best temperature uniformity
Precise control of process parameters

Consistent quality, perfect safety
Batch after batch

Shorter cycles, higher output
Rapid cooling cuts cycle times



PRODUCT FAMILY

Carbide.Sint | Ceramic.Sint

MORE INFORMATION?
EXPLORE ONLINE!

MATERIAL SOLUTIONS

DIFFUSION BONDING

- Heat exchangers & cooling structures (PCHE, liquid cooling)
- Semiconductor process components (heaters, showerheads, chill plates)
- Hydrogen infrastructure & fuel cell components
- Aerospace structural & thermal management parts
- Medical implants & surgical devices
- Hot runner systems & flow-optimized injection moulding components

No filler, no seam, no compromise – diffusion bonding creates joints as strong as the material itself.

Diffusion bonding joins components under precisely controlled temperature and uniaxial pressure in vacuum – entirely without filler materials or a liquid phase. The applied pressure brings surfaces into intimate contact; atomic diffusion across the interface then eliminates any remaining pores and forms a monolithic joint that is visually and mechanically indistinguishable from the base material.

The result: pore-free bonds with strength close to the base material, maximum corrosion resistance, and no need for post-cleaning. Diffusion bonding is used wherever conventional joining methods reach their limits.

No filler, no contamination risk
Maximum corrosion resistance, no post-cleaning needed

Similar or dissimilar – both work
Join metals, alloys and material combinations that other processes can't

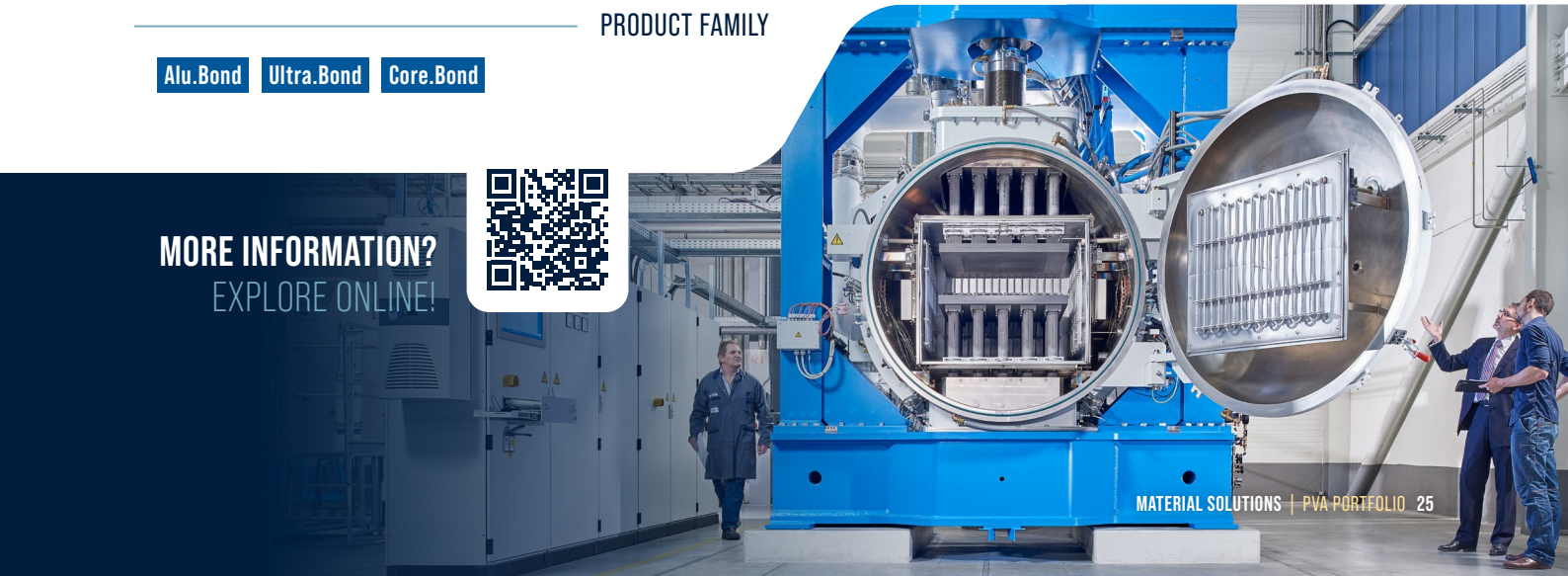
A joint you can't see or break
Bond strength matches the base material

Large-area bonds, distortion-free
Uniform pressure across the full surface

PRODUCT FAMILY

Alu.Bond Ultra.Bond Core.Bond

MORE INFORMATION?
EXPLORE ONLINE!



HIGH VACUUM BRAZING

Inaccessible joints, dissimilar materials, no-flux requirement – one vacuum process bonds them all, cleanly and with lasting strength.

High vacuum brazing joins components in an ultra-high vacuum atmosphere using a filler metal whose melting point lies well below that of the base materials. The filler is applied as wire, foil or paste – including to internal areas no longer accessible after assembly. During the highly homogeneous thermal process, the filler melts and flows into the joint by capillary action, dissolving constituents of the base materials and forming a strong metallurgical bond.

The vacuum atmosphere prevents oxidation throughout, eliminating the need for flux or post-cleaning. The result is joints with high strength, excellent corrosion resistance and outstanding thermal stability. High vacuum brazing is used wherever demanding joining requirements meet complex part geometries.

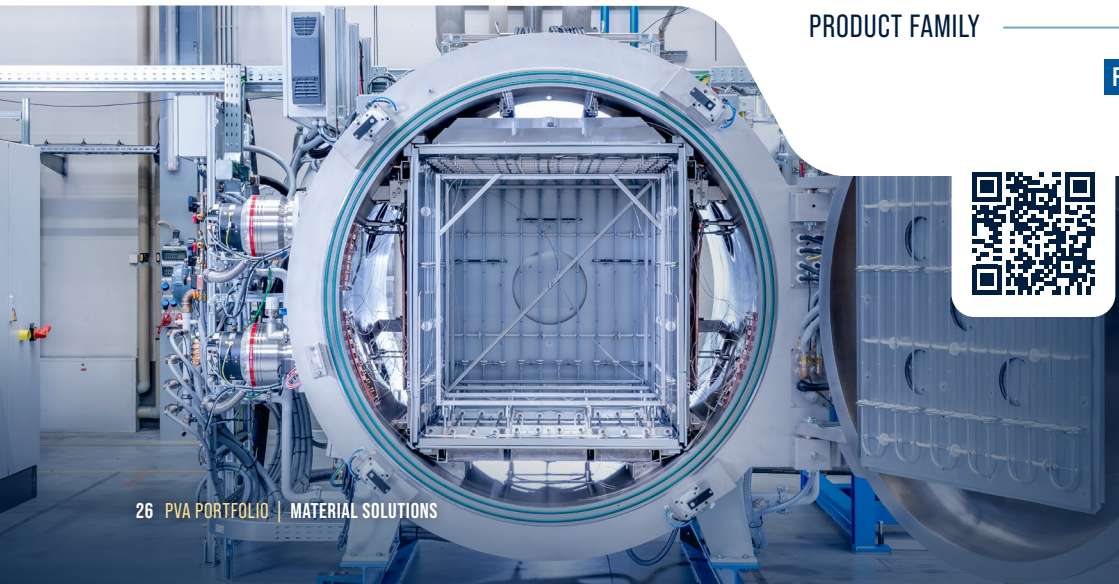
- Vacuum interrupters for power grid infrastructure
- Cutting, CBN & diamond tool production
- Heat exchangers & cooling plates
- Turbine components (aerospace & industrial)
- X-ray tubes & medical device components
- Active Metal Brazing (AMB) of ceramic substrates

Reach joints no other process can
Internal and inaccessible areas brazed with full process reliability

Strong, stable, corrosion-resistant
Metallurgical bond with high strength and outstanding thermal stability

No flux, no oxidation, no rework
Vacuum atmosphere keeps joints clean

Join dissimilar materials with confidence
Metals, ceramics, glass and refractory materials in one process



PRODUCT FAMILY

Flex.Braze | Vl.Braze | Lab.Braze

MORE INFORMATION?
EXPLORE ONLINE!

GRAPHITE PURIFICATION

- Purification of furnace components (graphite, CFC, carbon felt)
- Re-purification after MOCVD & CVD process deposits
- Recycling of Czochralski puller hot zone parts
- Semiconductor RTP carrier & component purification
- Photovoltaic C/C carrier purification
- Anode graphite treatment for battery & fuel cell applications

Stable carbides, process deposits, recycling costs – graphite purification eliminates impurities and extends component life.

Graphite purification removes metallic and non-metallic impurities from synthetic graphite, CFC and carbon felt components at temperatures up to 2,400°C. Some impurities can be vaporized under vacuum and high temperature alone; others form stable carbides that require reactive halogen gases – chlorine or fluorine – to convert them into volatile compounds that are then carried out of the hot zone and safely neutralized in a downstream gas scrubber.

This results in purity levels better than 3 ppm, meeting the stringent cleanliness requirements of semiconductor manufacturing, photovoltaics and other high-purity applications.

Reach purity levels other processes can't
For processes where contamination is not an option

Remove what vacuum alone cannot
Halogen chemistry converts stable carbides into removable compounds

Recycle instead of replace
Reuse and reuse expensive hot zone parts

Stay compliant without extra effort
Integrated gas scrubber, designed to German TA Luft emission limits — permit-ready in the EU and above local requirements in most export markets.

PRODUCT FAMILY

Carbon.Pure

MORE INFORMATION?
EXPLORE ONLINE!

FLUORIDE ION CLEANING

Oxide scales, sulfidation, TBC residues – fluoride ion cleaning removes them from superalloy components without touching the base metal.

Fluoride Ion Cleaning is a controlled gaseous chemical process for removing oxides, corrosion products, sulfidation damage, thermal barrier coating residues and embedded contaminants. The component is heated in a furnace – typically to around 1,000°C – and exposed to fluorine-containing process gas. Fluoride ions react with metal oxides to form volatile metal fluorides that vaporize or are removed from the surface, leaving the base metal intact.

Unlike mechanical cleaning methods, FIC penetrates small cooling holes and complex internal geometries, removes internal oxidation, and preserves the dimensional accuracy of expensive superalloy blades.

- **Turbine blade & vane refurbishment** (aerospace & power generation)
- **Oxide scale & sulfidation removal from superalloys**
- **Thermal barrier coating (TBC) residue removal**
- **Pre-welding & pre-brazing surface preparation**
- **Aluminization removal & coating stripping**
- **Internal cooling hole & complex geometry cleaning**

Clean without damaging the base metal
Non-mechanical removal preserves dimensional accuracy and part integrity

Reach where no tool can
Penetrates cooling holes and internal geometries that grit blasting cannot

Extend the life of expensive components
Refurbish superalloy blades instead of replacing them

Precise, repeatable, controlled
Gaseous process with defined parameters – consistent results every run

PRODUCT FAMILY

FIC-SYSTEM

MORE INFORMATION?
EXPLORE ONLINE!

PULSE PLASMA NITRIDING

- Automotive powertrain components (crankshafts, camshafts, synchronizer rings)
- Cutting tools, stamping & forming dies
- Forging & mold components
- Aerospace components & mechanically stressed defense parts
- Gears, coupling parts & transmission components
- Titanium & stainless steel surface hardening

Wear, corrosion, surface fatigue – PulsPlasma® Nitriding hardens steel surfaces precisely where it matters, without harmful by-products.

Our PulsPlasma® Nitriding (PPN) is a thermo-chemical heat treatment that enriches steel surfaces with nitrogen – and optionally carbon or oxygen – using a pulsed direct-current glow discharge under vacuum. The plasma splits gas mixtures of nitrogen, hydrogen and methane, the heat diffuses nitrogen atoms into the surface forming extremely hard surface conditions and nitride layers. Key process parameters – gas composition, temperature, pressure, pulse duration and voltage – can be adjusted precisely to tailor the surface properties to each specific component and application.

The results are surfaces with significantly increased hardness, wear resistance and corrosion resistance, usually ready for direct use without post-treatment. PPN is applied wherever steel components face high tribological and mechanical demands.

Harder surfaces, longer service life
Wear and corrosion resistance

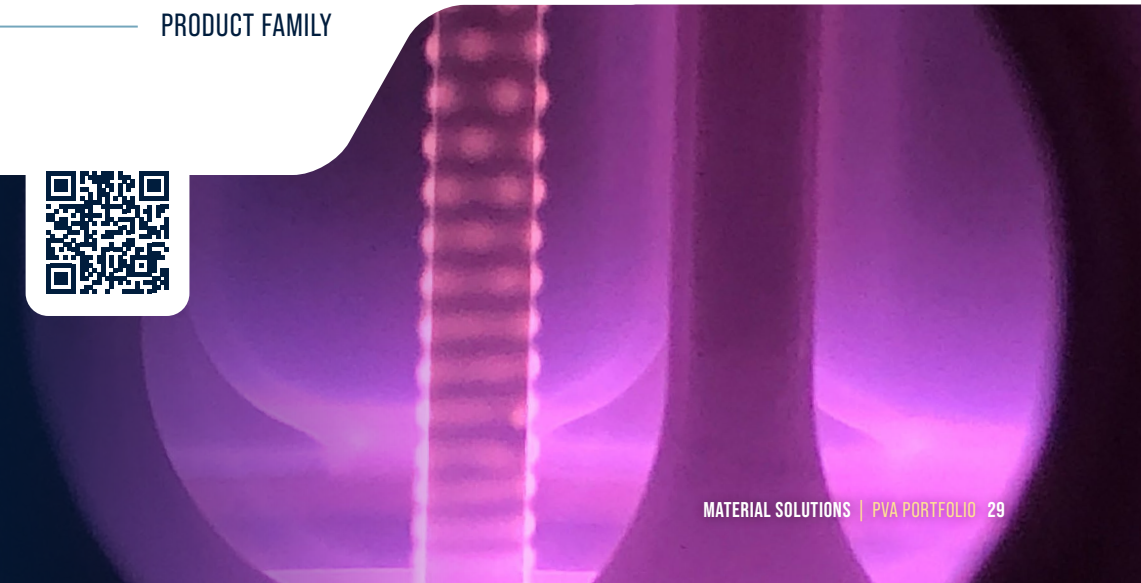
Precise control, repeatable results
Adjust gas, temperature and plasma power

Easy to control system, ready to use parts
No post-treatment needed

PRODUCT FAMILY

PlaTeG.Nitride

MORE INFORMATION?
EXPLORE ONLINE!



PLASMA SURFACE TREATMENT FRONTEND

Photoresist, oxide layers, contamination – anything left on the wafer surface puts the next process step at risk. Plasma removes it reliably.

Plasma Frontend systems remove photoresist, organic and inorganic residues, and surface contamination from wafer surfaces – under vacuum, using reactive gas mixtures energized by microwave power. The plasma selectively breaks down unwanted surface layers without affecting the underlying substrate and can also activate surfaces for subsequent deposition or bonding steps.

Process parameters including gas composition, pressure, power, and temperature are precisely controlled and fully recipe-driven, ensuring reproducible results across batch and single-wafer configurations alike. The technology is used throughout front-end semiconductor manufacturing wherever surface cleanliness and defined surface conditions directly determine the quality of the next process step – from manual lab systems to fully automated production lines with SECS/GEM integration.

- Photoresist ashing after lithography (batch and single-wafer)
- Descumming prior to galvanization and lift-off processes
- Organic and inorganic contamination removal between process steps
- Surface activation before layer deposition and further processes
- Thinned wafer and tape-and-frame processing
- SAW filter and optoelectronic component manufacturing

Batch or single-wafer
GIGAbatch for throughput, GIGAfab for precision

Tight uniformity where it matters
Below 5 % across 300 mm, temperature-controlled

Scales with your production
From manual lab system to fully automated fab

PRODUCT FAMILY

GIGAfab GIGAbatch

MORE INFORMATION?
EXPLORE ONLINE!

PLASMA SURFACE TREATMENT BACKEND

- Die and pad cleaning before wire bonding
- Lead frame and substrate surface activation prior to encapsulation
- Underfill and molding compound adhesion preparation
- Wafer-level packaging surface pretreatment
- Surface energy modification for inkjet-based OLED manufacturing
- Solar cell edge isolation via plasma etching

Poor adhesion in packaging leads to field failures. Low-pressure plasma cleans and activates surfaces before every critical bonding or encapsulation step.

Plasma Backend treatment cleans and activates surfaces in semiconductor packaging and advanced assembly – wherever bond strength, encapsulant adhesion, or long-term reliability depend on surface condition before joining. Reactive plasma removes organic contamination, strips residues, and shifts surface energy from hydrophobic to hydrophilic without thermal stress or mechanical contact. Process parameters including gas composition, power, pressure, and time are precisely controlled and recipe-driven, ensuring consistent, repeatable results.

The technology handles both batch and continuous strip-type processing and is applied to dies, lead frames, substrates, and packaging components across a wide range of formats. Beyond packaging, plasma etching with fluorine-based chemistry is used for solar cell edge isolation – demonstrating the versatility of the same process principle across different application contexts.

Manual to fully automated
Scalable from single system to inline production

Fast and damage-free
Microwave plasma, no thermal stress on components

PRODUCT FAMILY

GIGA690 80PLUS

MORE INFORMATION?
EXPLORE ONLINE!

MATERIAL SOLUTIONS

PLASMA CLEANING & ACTIVATION

Residues and poor adhesion put yield at risk. Low-pressure plasma removes contaminants and activates surfaces – cold, controlled, and repeatable.

Low-pressure plasma uses RF-energized gas to generate reactive ions and radicals, treating surfaces at the molecular level – without heat or damage. It removes organic residues, oxides, and contaminants while increasing surface energy for superior wettability and adhesion.

Tailored recipes for gas, pressure, power and time, ensure uniform, repeatable results across polymers, metals, glass, ceramics, and semiconductors. Applications include cleaning, activation, etching, passivation, and thin-film deposition.

The technology is ideal for high-reliability industries where surface quality impacts performance and yield.

Ultra-clean surfaces, instantly
Removes residues – no heat, no damage

Stronger bonds, better adhesion
Boosts surface energy for coatings & bonding

Cold process, safe for sensitive materials
Low-temperature plasma – no thermal stress

Consistent results, every batch
Recipe-controlled – repeatable precision

- Photoresist ashing, descum & via cleaning (semiconductor)
- Wafer & die surface activation for bonding & underfill
- Wire bond pad & lead frame cleaning
- Medical device activation & biocompatible coatings
- Adhesion promotion for aerospace & automotive bonding
- Power device passivation & contact preparation

PRODUCT FAMILY

IoN PLASMA SYSTEM SERIES

MORE INFORMATION?
EXPLORE ONLINE!

MATERIAL SOLUTIONS

ATMOSPHERIC PLASMA CLEANING

- Wire bonding & die bonding activation – semiconductor packaging
- ACF adhesion promotion for flat panel display manufacturing
- Preparation for encapsulants, underfills & conformal coatings
- Bipolar plate cleaning & activation in fuel cell production
- Pre-coating activation for functional & biocompatible surfaces (medical devices)
- Windshield bonding & headlight lens preparation (automotive)

Organic contamination, low surface energy, poor adhesion – eliminated at atmospheric pressure, directly in your production line.

Atmospheric plasma generates a high-energy stream of reactive ions, radicals, and UV radiation by ionizing process gas – air, oxygen, or nitrogen – at ambient pressure via high-voltage excitation. Directed onto the substrate surface, this plasma jet removes organic contaminants, increases surface energy, and grafts functional chemical groups that significantly improve wettability, adhesion strength, and coating bond integrity.

Operating at atmospheric pressure eliminates the need for vacuum chambers entirely, enabling direct inline integration into existing high-throughput production lines with minimal footprint and zero process interruption. Treatment is non-contact, spatially precise, and geometry-independent – effective on flat, curved, and complex surfaces as well as sensitive or miniaturized components.

No vacuum. No chamber. No delay.
Runs at atmospheric pressure – plug into any line

Universal substrate compatibility
Polymers, glass, ceramics, metals, semiconductors

Pinpoint surface treatment
Target exact zones. No masking. No fixturing.

Manual or fully automated
Plasma Pen™ for hand use, Robo Pen for robotics

PRODUCT FAMILY

PLASMA PEN™ ROBO PEN

MORE INFORMATION?
EXPLORE ONLINE!

SERVICE

GLOBAL EXPERTISE.
LOCAL RESPONSE.

High-performance systems need more than technology – they need a partner who stands by your side reliably throughout their entire operational life. PVA TePla offers a worldwide service concept precisely tailored to your requirements: rapid in response, deep in expertise, and genuinely collaborative.

Our qualified specialists are deployed around the globe – with short response times, proactive maintenance strategies, remote support, and individually designed service offerings. So you can focus on your core business while we ensure your systems keep running at peak performance.

PVA TePla. Your Partner for Peak Performance.
Worldwide. Across the Entire Life Cycle.

LIFE CYCLE SERVICE
PERFORMANCE THAT LASTS

Our Life Cycle Service accompanies your systems from day one – through every phase of their operational life. From installation and commissioning to preventive maintenance and system upgrades, we ensure your equipment delivers peak performance at every time.

- **Service Level Agreement**
  A tailored service agreement gives you predictable costs, defined response times, and consistent expert care. Our agreements cover remote support with guaranteed response times, regular on-site preventive maintenance and access to critical spare parts whenever you need them most.
- **First Level Support**
  When questions arise or issues occur, our support specialists are available – competent, straightforward, and without detours. Our First Level Support resolves problems quickly and efficiently, keeping your processes on track.
- **Spare Parts Management**
  Reliable availability starts with having the right part at the right time. PVA TePla provides a complete spare parts service from a single source: premium quality, fair and transparent pricing, and fast worldwide delivery.
- **Preventive Measures**
  Our service technicians work closely alongside your teams to optimize maintenance routines, prevent unexpected breakdowns, and help you get the most out of your equipment – consistently and long-term.
- **System Upgrades**
  Technology evolves – and so do your systems. Through targeted modernizations and upgrades, we extend the operational lifetime of your equipment, unlock new performance potential, and safeguard the long-term competitiveness of your production.

SERVICE

CONTRACT SERVICE
EXPERTISE ON DEMAND

Our Contract Services expand your capabilities: leverage PVA TePla's technological expertise wherever you need individual solutions – flexible, needs-based, and at the highest level of quality. Instead of investing in your own systems, infrastructure and specialist know-how, you gain direct access to our technology centers, our laboratories and the experience of a partner who has been building high-tech equipment for decades.

Whether you require additional capacity at short notice, want to validate a new idea before scaling, or are looking for a long-term partner for recurring tasks – we adapt to your requirements, work confidentially, and deliver results you can rely on.

- **Vacuum Processing**
  For more than 20 years, PVA TePla has been a trusted service partner in vacuum process technology. We support our customers from the initial idea through to series production – covering vacuum brazing, diffusion bonding, vacuum heat treatment, and engineering. We bridge manufacturing gaps and guide your development through every phase.
- **Metrology Services**
  Our Contract Metrology Service offers analysis via Scanning Acoustic Microscopy (SAM) for non-destructive internal defect detection, and Scanning Infrared Depolarization (SIRD) for the precise characterization of crystal defects – without capital investment in your own measurement equipment.
- **Plasma Application & Process Support**
  Facing application challenges or looking to develop new plasma processes? Our team supports you in solving application-specific problems and developing customized process solutions – from initial concept through to safe and reliable implementation.

INNOVATION

THE INNOVATION HUB

TURNING RESEARCH INTO REALITY

Innovation is our driving force – accelerating ideas from the lab to large-scale application.

At PVA TePla, innovation is not a department – it is a mindset embedded across the entire organization. We believe that the most pressing challenges of our time, from climate neutrality and renewable energy to digital transformation and the circular economy, can only be solved through continuous technological progress. That is why we invest consistently in research, development, and the industrialization of emerging technologies.

WHERE RESEARCH MEETS REALITY

At the heart of our innovation ecosystem is the PVA TePla Technology Hub: a state-of-the-art R&D environment spanning more than 1,000 m² of shopfloor space and an additional 500 m² of laboratories across three European locations. Here, our specialists work alongside leading research institutions and industry partners to evaluate new materials, processes, and technologies for their industrial suitability. The TechHub bridges the gap between scientific discovery and scalable application – reducing development risks, accelerating time-to-market, and transforming research results into tangible industrial value.

DRIVING THE FUTURE OF POWER ELECTRONICS

One of the most strategically significant areas of our current R&D activity is silicon carbide (SiC) – a semiconductor material that is redefining performance in electric vehicles, energy storage, 5G networks, and industrial power conversion. Through the PVA SiC Initiative, we systematically evaluate and optimize the entire SiC manufacturing chain, from crystal growth to process qualification, to improve yield, quality, and efficiency for our customers worldwide.

From groundbreaking research to market-ready products – PVA TePla translates innovation into real competitive advantage for our customers.

WANT TO FIND OUT MORE?
CONTACT US FOR INFORMATION!

PVA TePla AG
Im Westpark 10–12 | 35435 Wettenberg

+49 (0)641 686 90-0
info@pvatepla.com
www.pvatepla.com

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