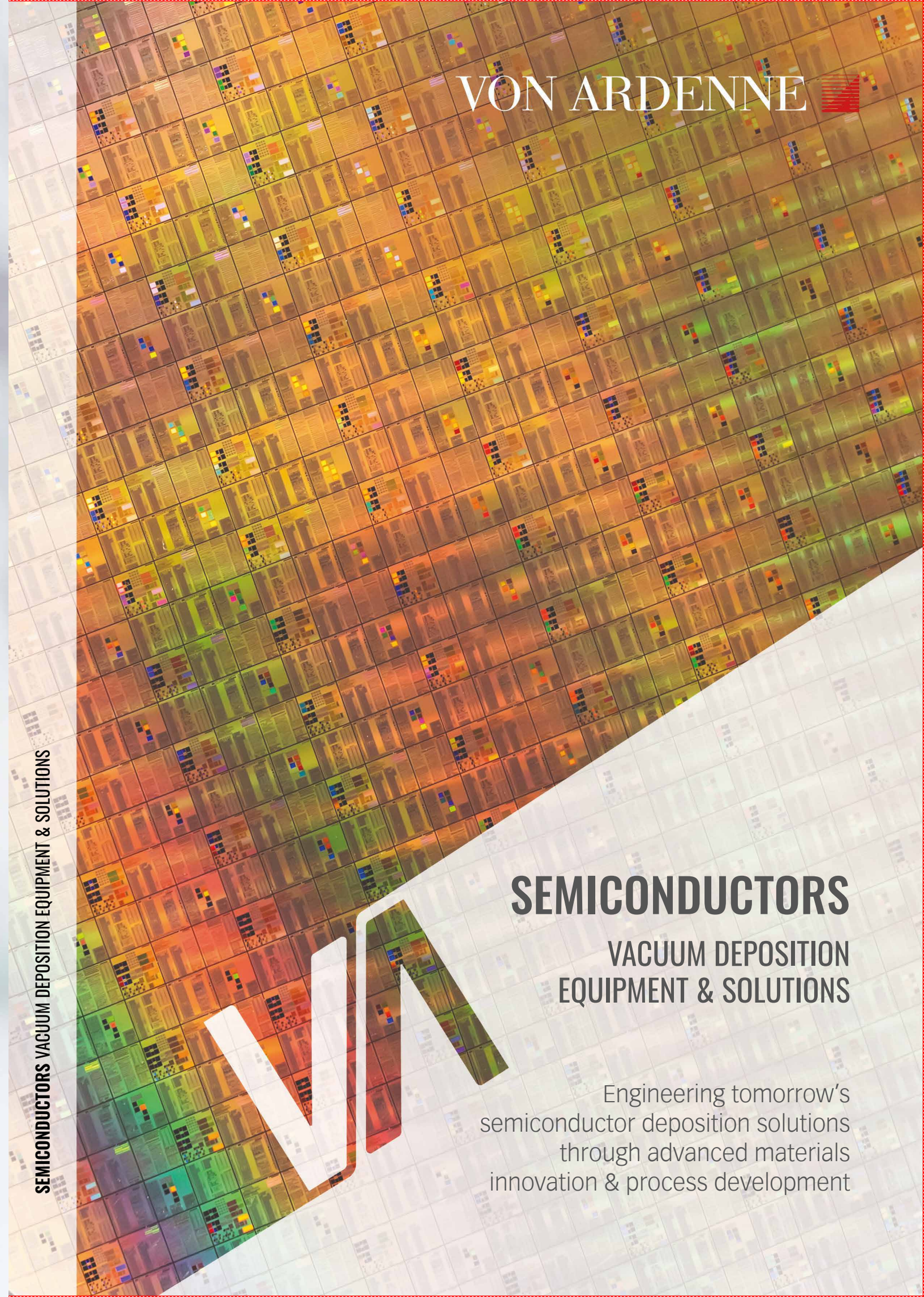


VON ARDENNE

SEMICONDUCTORS

VACUUM DEPOSITION EQUIPMENT & SOLUTIONS

Engineering tomorrow's semiconductor deposition solutions through advanced materials innovation & process development

SEMICONDUCTORS VACUUM DEPOSITION EQUIPMENT & SOLUTIONS

SEMICONDUCTORS

Engineering tomorrow's semiconductor deposition solutions through advanced materials innovation & process development

The world of semiconductors is always evolving. Meeting emerging requirements demands customer-oriented, flexible and new solutions.

A deposition solutions specialist, VON ARDENNE offers comprehensive services to support our customers. Our high-precision engineering and materials science expertise enable custom design, engineering, manufacturing, commissioning and service for deposition equipment and components.

Our strong legacy in vacuum technology and deposition solutions, as well as materials and optics technologies, mean we excel in developing leading-edge semiconductor processes and equipment to meet each customer's unique requirements.

Configuration of custom solutions to meet emerging requirements

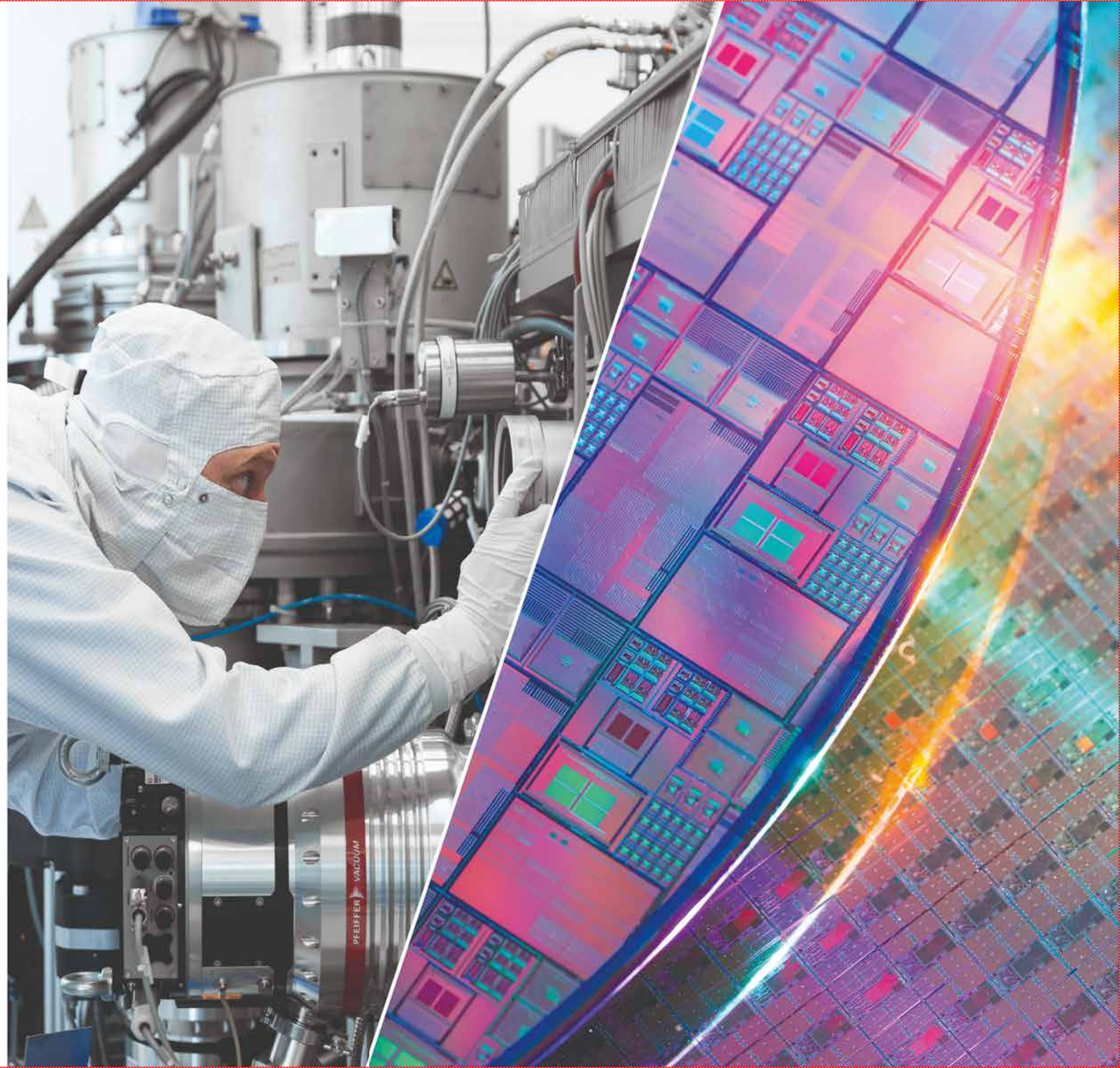
by highly experienced teams

Configure-to-order flexibility

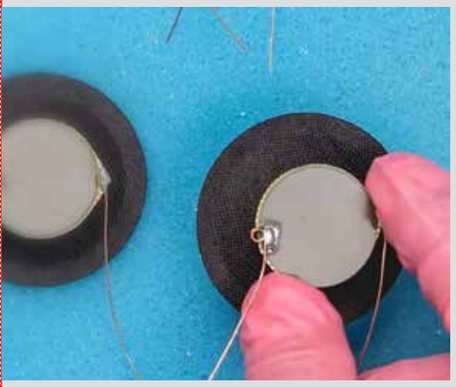
in platform & component development for advanced technologies

Long-term, highly collaborative partnerships

support customers from project start to finish



PIEZOMEMS



Overcoming film challenges for sensors & actuators

with high-precision deposition of finely tuned piezo layers

From smartphones to smartwatches, piezoelectric micro-electro-mechanical systems (piezoMEMS) power the tiny sensors that make our devices responsive, intuitive, and energy efficient. With ultra-low power consumption and high sensitivity, piezoMEMS are the invisible force driving the future of wearable tech, IoT, and smart living.

The **OPTA X** platform achieves the ultra-precise deposition of high-performance piezoelectric materials such as AlN and AlScN. They are tailored for piezoMEMS applications due to their excellent mechanical properties, CMOS compatibility, and environmental stability. These advanced thin films facilitate the creation of highly sensitive sensors and actuators by efficiently converting mechanical forces and displacements into electrical signals, and vice versa.

At VON ARDENNE, we have applied our extensive materials science and deposition expertise to support this emerging market. Our process is engineered to provide reliable homogeneity in both thickness and stoichiometry across 200-mm and 300-mm wafer substrates, optimizing throughput and yield in high-volume manufacturing.

- **Modular design ensures flexible system configuration**
  to address any process requirement
- **Extremely high productivity**
  keeps operating costs low
- **Superior material properties**
  through highly engineered deposition processes

OPTA X
Rotary Disc Coating System

Cluster Systems
for Research, Development & Production

ADVANCED PACKAGING

Metallization for the next generation of advanced packaging

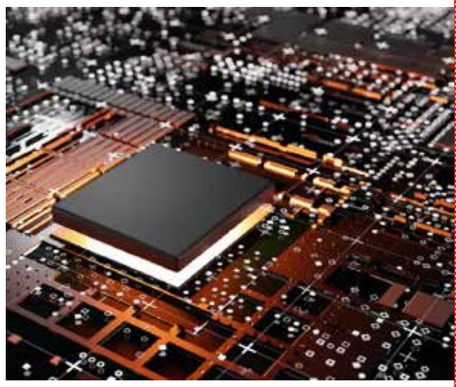
with excellent material adhesion & uniformity

There are many approaches to semiconductor advanced packaging, the art of efficiently and compactly connecting multiple chips to maximize system performance.

Increasingly complex electrical systems are created by advanced packaging approaches. As a result, the requirements for the conductive and insulating layers are becoming more complex. At the same time, the substrates and the utilization of the available area must be optimized to manufacture these devices cost-effectively.

Materials, and the processes used to deposit them, are increasingly complex, demanding highly engineered platforms that can solve the most complex metallization challenges for high-aspect-ratio structures. And this is where we excel: materials and equipment innovation, on wafer or panel substrates, with sub-nanometer precision.

- **Highly productive system platform**
  based on extensive process know-how
- **Easy adaptation to new processes & requirements**
  due to flexibly configurable equipment
- **Cost-efficient equipment**
  due to fully automated concept



OPTA X
Rotary Disc Coating System

HISS
Horizontal Coating System

Cluster Systems
for Research, Development & Production

VISS
Vertical Coating System

MEMS

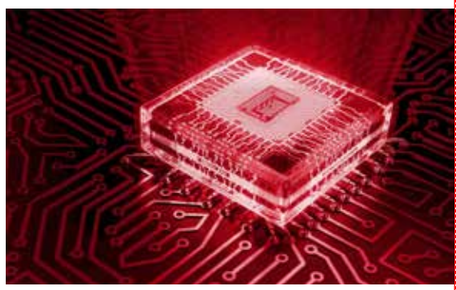
Highly configurable systems for next-generation MEMS manufacturing

engineering highly customized multi-process support

Micro-electro-mechanical systems (MEMS) are tiny devices that combine the properties of mechanical and electronic components. They are used in a wide range of applications, including sensors, display technologies and microfluidics.

We offer you flexible, highly configurable vacuum deposition systems for MEMS manufacturing. They enable you to combine different technologies, such as etching, deposition of metal, semiconductor and passivation layers, post-treatment or other custom requirements, depending on your specific application.

- **High-flexibility, configurable equipment**
  easily supports new processes & requirements
- **Compact design**
  saves valuable fab floorspace
- **Fully automated platforms**
  drive cost efficiencies



OPTA X
Rotary Disc Coating System

Cluster Systems
for Research, Development & Production

CLUSTER SYSTEMS

HIGHLY FLEXIBLE & SCALABLE CLUSTER SYSTEMS

For research, development & production

The cluster systems CS200 and CS300 are modular coating systems suitable for highly flexible or highly productive processes in the development and production of semiconductor, optics, or photovoltaic applications. They are specifically designed for processing substrates with a diameter of 200 mm or 300 mm (including G12 wafers).

Thus, the VON ARDENNE cluster systems are the ideal choice for the development of new coating technologies and the production of layers with specific properties and high reproducibility. Applications include sensors and silicon through-silicon vias (TSV) for 3D advanced packaging technology in the semiconductor industry. Furthermore, the CS300 is used in the development of new solar cell generations such as TOPCon and perovskite tandem.

Thanks to their great flexibility, VON ARDENNE cluster systems help you reduce your operating costs. The systems can be individually configured for different tasks: up to seven process chambers and one or more load locks can be installed around the central transfer chamber. All chambers are separated from each other both in terms of vacuum technology and control technology.

Scalable

through modular design

Adapted to your needs

through flexible configuration

Helps you reduce operating costs

through flexibility

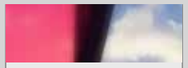
CS200

- Ideal for applications in the semiconductor and optics industries
- High throughput
- Compact dimensions

CS300

- Ideal for applications in the semiconductor, optics, and PV industries
- Optimized for R&D and production of TOPCon and perovskite tandem solar cells

APPLICATIONS


Optical Windows


Lift-off Processes


Advanced Packaging

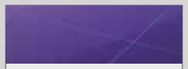

Dielectric Mirrors


Wafer-Level Optics


Automotive Displays


Displays for Consumer Electronics


MEMS


IBC Solar Cells


TOPCon Solar Cells


Heterojunction Solar Cells


Perovskite Tandem Solar Cells


Power Electronics


PiezoMEMS

TECHNICAL DATA

Subject to change without notice due to technical improvement.

Substrates
Wafers (Si, GaAs,..), glass, polymers, metals

Coating area
CS200: up to 200 mm diameter
CS300: up to 300 mm diameter

Deposition method
Sputtering: HIPIMS, DC, pulsed DC, AC, RF
Plasma source: inverse sputter etcher (ISE) or ion source

Substrate temperature
RT/ 800 °C

Transport
Automatic by robot

System control
PLC module, WICON control software

OPTA X

HIGHLY PRODUCTIVE DOUBLE-SIDED COATING

For demanding multi-layer systems

With the OPTA X200 and OPTA X300, we offer you highly-productive coating systems. They are suited both for the most demanding optical coating systems and for the precise deposition of, for example, high-performance piezoelectric materials such as AlN and AlScN. This applies especially to multilayer optics with a high number of alternating layers and high-quality layer stacks for microelectronic applications and semiconductor systems.

The rotary disc systems coat both sides horizontally and are designed, depending on the model, for processing substrates with diameters of 200 mm or 300 mm (including G12 wafers). For optimal coating, the special CARS technology is used. But other process modes such as Meta Mode, reactive or non-reactive sputtering are also available.

For maximum variability, magnetrons and/or plasma sources can be integrated on up to five ports per coating side. In-situ measurement technology for tracking and correcting the coating progress is also available for optical monitoring.

Both models are equipped with an automatic handling system. This is modularly constructed and enables safe loading with different substrates, which are guided through the system in adaptable carriers.

Highest precision & quality

through fast, clean, low-defect, homogeneous coatings

Anti-warp effect

through double-sided deposition with different materials

Variable product adaptation:

layers, layer systems & component geometry

OPTA X200

- Optimized for applications on substrates with diameters of up to 200 mm
- Meets the highest demands in optical applications through highly pure and defect-free optical layers
- Unique homogeneity and chemical composition of the electrical layers for optimal results in microelectronics and the semiconductor industry

OPTA X300

- Processing substrates with diameters of up to 300 mm, including G12 wafers
- Meets the highest demands in optical applications through highly pure and defect-free optical layers
- Unique homogeneity and chemical composition of the electrical layers for optimal results in microelectronics and the semiconductor industry

APPLICATIONS


Optical Windows


Advanced Packaging


Dielectric Mirrors


Wafer-Level Optics


Automotive Displays

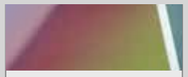

Displays for Consumer Electronics


MEMS


Power Electronics


PiezoMEMS


Lenses & Optical Domes


Optical Interference Filters

TECHNICAL DATA

Subject to change without notice due to technical improvement.

Substrates
Silicon wafers, glass, polymers, metals

Coating area
Up to 200/300 mm

Deposition arrangement
Double-sided, DC, pulsed DC, AC, CARS, meta mode, reactive sputtering, RF

Substrate temperature
RT / 300°C

Deposition technology
Magnetron sputtering: planar, rotatable

Type of transport
Carrier or robot

System control
Siemens PLC

VISS

HIGHLY FLEXIBLE & SCALABLE INLINE SYSTEMS

For vertical processes & medium productivity

The VISS400 and VISS600 are modular systems for vertical coating processes. They are ideal if you want to scale your laboratory applications to production level.

Both platforms are available as an inline version with one end or as a through-feed version for continuous processes. Depending on the model, they can be scaled for substrate widths of 400 mm or up to 600 mm. The substrates are transported using a carrier system that is tilted vertically by seven degrees. The system can be loaded and unloaded without touching the front side of the substrates.

This system concept allows for cost-efficient coating of large substrates. Together with the vertical substrate transport, this enables a particle-free coating process, qualifying the VISS systems for use in the semiconductor industry—especially for applications such as advanced packaging, power electronics, and piezo sensors.

Scalable

through modular design

Easily adaptable to your requirements

through flexible configuration options

Loading without touching the substrate front side

due to carrier transport

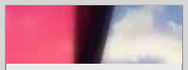
VISS400

- Compact dimensions and low weight enable use in confined production spaces

VISS600

- High productivity thanks to substrate widths up to 600 mm

APPLICATIONS



Optical Windows

Lift-off Processes

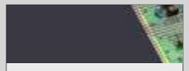
Advanced Packaging

Dielectric Mirrors

Large-Area Optics

Automotive Displays

Displays for Consumer Electronics



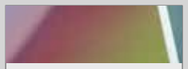
Printed Circuit Boards

Thin-Film Photovoltaics

TOPCon Solar Cells

Perovskite Tandem Solar Cells

Power Electronics



Optical Interference Filters

TECHNICAL DATA

Subject to change without notice due to technical improvement.

Substrates
Glass, polymers, metals

Coating area
Up to 600 mm x 2400 mm

Deposition arrangement
Double-sided, pulsed DC, AC, RF

Substrate temperature range
RT / 200°C / 350°C

Deposition technology
Magnetron sputtering, linear evaporation, pre- and post-treatment

Transport type
Inline, by carrier or stacker

Loading & unloading
Optional automation by robot

System control
VA WICON with graphical user interface

HISS

HIGHLY FLEXIBLE & SCALABLE INLINE SYSTEMS

For horizontal substrate transport

The HISS300 and HISS600 are modular coating systems for the horizontal coating of substrates. They are the best choice if you are looking for a very flexible production system with small or medium throughput, equipped with proven technology.

Thanks to their modular design, the systems can be configured according to your needs. We offer various configurations, such as the version with only one end for a smaller production scope.

The systems offer high process flexibility for sputtering and evaporation processes as well as various pre- and post-treatment methods.

The flexible and dynamic design of the systems with standardized modules allows for customer-specific configuration – they can thus be adapted to new processes or requirements. Therefore, our customers are able to act very dynamically and can adapt to the evolution of their product.

Double-sided or single-sided coating

to suit your substrate & process requirements

High flexibility

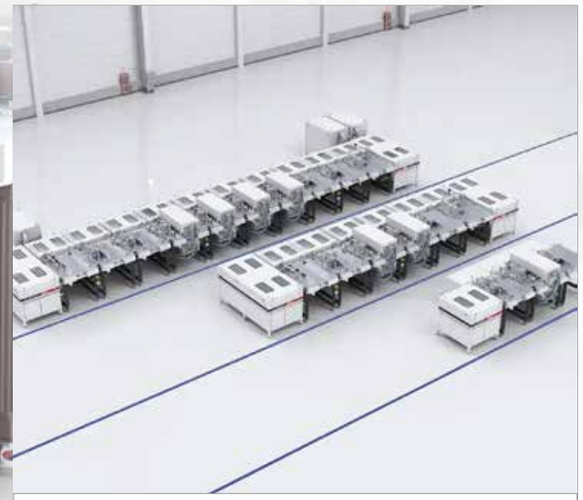
in process technology and equipment configuration

Ideal for R&D up to series production

through easily scalable processes

HISS300

- Focus on research and development of new coating systems or improvement of existing ones
- Testing of different process technologies with low space requirements
- Scalability to small series and production due to platform approach



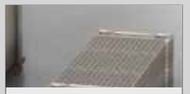
HISS600

- Focus on developing new or improving existing coating systems
- Possibility of testing in small series and, if required, 24/7 production
- Scalability to larger system concepts due to platform approach

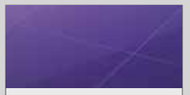
APPLICATIONS


Advanced Packaging


Radar Antennas


Metallic Bipolar Plates


Printed Circuit Boards


IBC Solar Cells


TOPCon Solar Cells


Heterojunction Solar Cells


Perovskite Tandem Solar Cells


Power Electronics

TECHNICAL DATA

Subject to change without notice due to technical improvement.

Substrates
Glass, polymers, metals, silicon wafers

Coating area
HISS300: up to 300 mm x 300 mm,
900 mm x 300 mm on request
HISS600: up to 1000 mm x 600 mm

Deposition arrangement
Double-sided or single-sided

Substrate temperature
RT … 250°C

Deposition technology
Magnetron sputtering, linear evaporation, pre- and post-treatment

Transport type
Carrier or glass transport

Loading & unloading
Optional automation by robot

System control
Siemens SPS and WinCC

VA CLEANROOM

CLEANROOM-COMPATIBLE SAMPLING & ASSEMBLY FACILITY

FOR PRECISION OPTICS, PHOTONICS & SEMICONDUCTOR APPLICATIONS

VA CLEANROOM

Sampling & Layer Development

Our new cleanroom offers the best conditions with ISO5 and ISO7 zones for the assembly and commissioning of systems for complex tasks in the fields of semiconductor technology as well as materials science and medical technology, partially even with the highest purity requirements (ISO5 AMC).

The cleanroom will be equipped with a new OPTA X system, which will be available from mid-2026 for joint material and device developments. Together with a top-tier team of technicians and developers, we will be able to contribute to your next generation of coating applications.

We cover the entire process from simulating layers and their functions, through laboratory and pilot-scale sampling, to measuring and evaluating layer and device properties. This gives you the opportunity to test the function of the coating for your product in a relevant environment or including your process-chain in advance.

- **Wafer substrate handling in ISO5 environment**
  for analysis at the wafer level or for further external processing
- **Risk minimization & faster market readiness**
  through industrial testing
- **Gaining insights through accompanying simulation**
  of layer processing and related properties
- **Individual access**
  to a variety of coating materials & services as well as R&D partners

OUR STRENGTHS

In-House Technology & Application Center

- Sample coatings of customer applications
- Development of customized layer stacks
- Product & process verification and optimization
- Testing of new technologies and components

Professional Simulation Support

We offer professional simulation technology to ensure best process quality with regards to plasma, heat and cooling. Furthermore, our simulation tools help demonstrate, develop and improve layer properties and define or optimize processes, details and the performance of our systems.

Close Partnership

VON ARDENNE has a network of partners for even more profound R&D work and to identify future technologies. It consists of:

- Fraunhofer Institutes
- Institutes of the Helmholtz Association
- Universities
- Companies

Global Project Experience

VON ARDENNE equipment is used in over 50 countries. We have established an installed base of hundreds of coating systems worldwide, ranging from small tools to equipment for large-area coating applications for several markets.

Comprehensive Service Portfolio

- VON ARDENNE service hubs around the world
- On-site service
- Remote access by our technology department
- Regular technical and technological trainings
- Spare & wear part warehouse close to customers
- Lifecycle extension of wear parts

Upgrades & Retrofits

As soon as your business is growing, your VON ARDENNE equipment will grow accordingly - thanks to its modular design and the upgrades we provide. We will also supply you with the necessary technology upgrades if you decide to change your applications. Furthermore, when your equipment is ageing, we will retrofit your systems with new components, no matter if they are VON ARDENNE or third-party machines.

WHO WE ARE & WHAT WE DO

VON ARDENNE develops and manufactures industrial equipment for vacuum coatings on materials such as glass, wafers, metal strip and polymer films. These coatings give the surfaces new functional properties and can be between one nanometer and a few micrometers thin, depending on the application. Our customers use these materials to make high-quality products such as architectural glass, displays for smartphones and touchscreens, solar modules and heat protection window film for automotive glass.

We supply our customers with technologically sophisticated vacuum coating systems, extensive expertise and global service. The key components are developed and manufactured by VON ARDENNE itself. Systems and components made by VON ARDENNE make a valuable contribution to protecting the environment. They are vital for manufacturing products which help to use less energy or to generate energy from renewable resources.

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