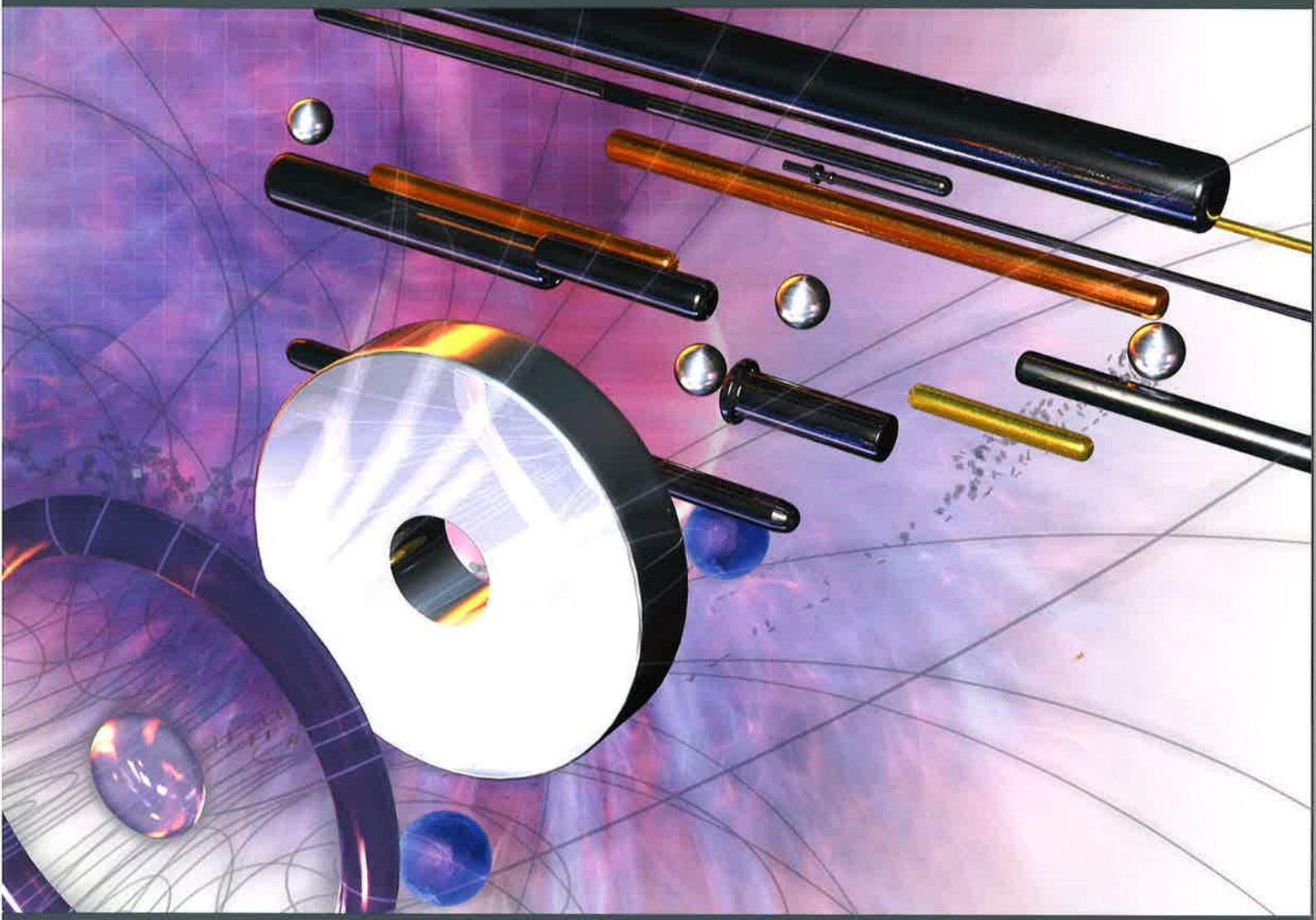
Heraeus

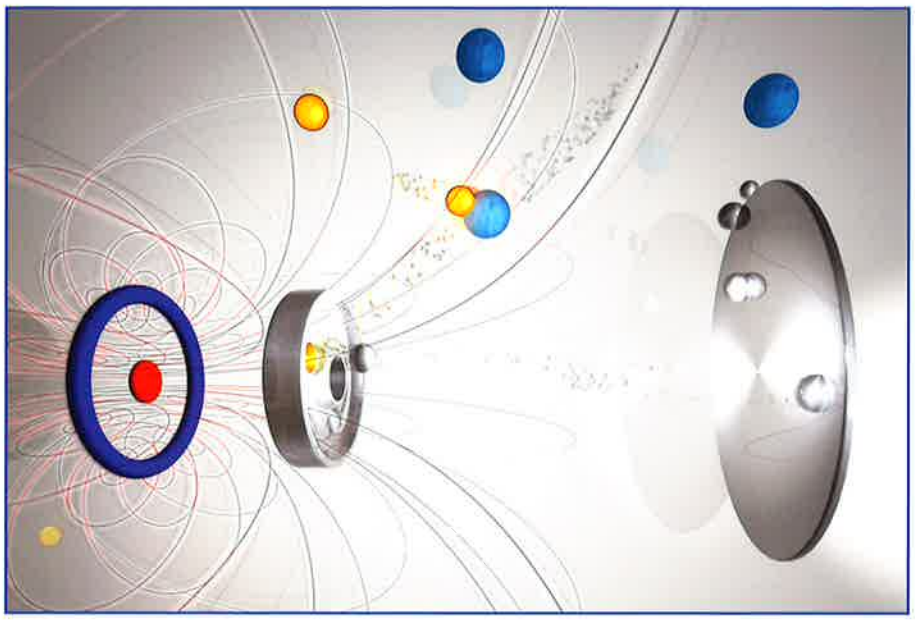


PVD Coatings

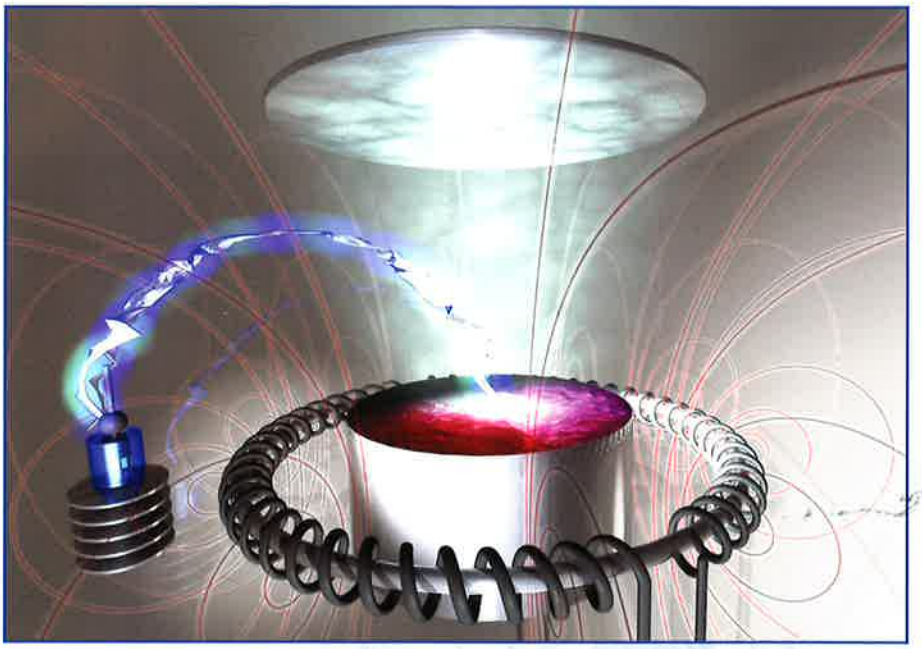
W. C. Heraeus

Coating under vacuum

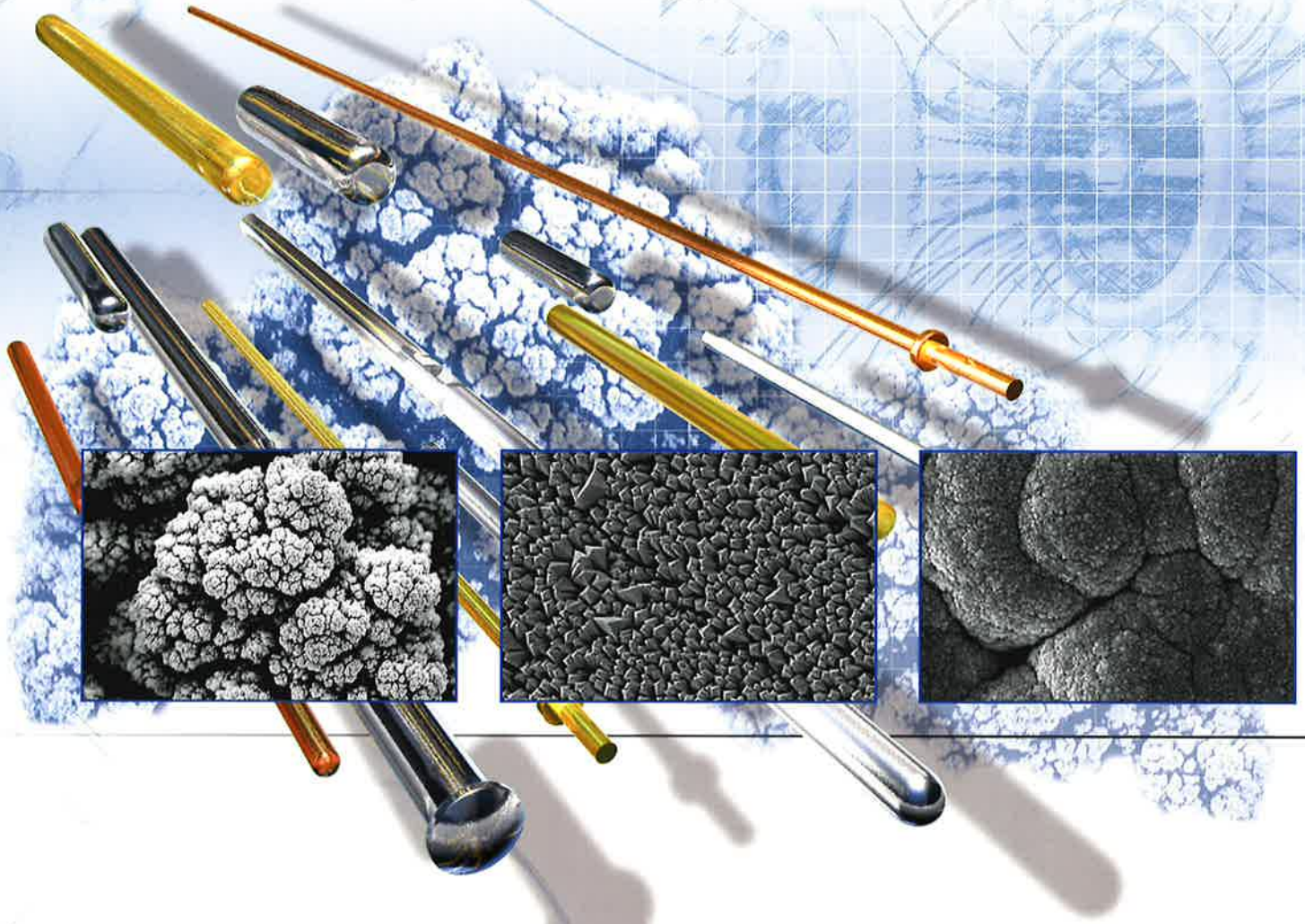
We differentiate between two PVD processes: Cathode sputtering and electron beam evaporation



In sputtering a process gas, usually argon, is ionised in the gas phase and accelerated by an electric field onto the material which is to be deposited (target). Atoms and atom clusters are knocked out of the target when it is hit by the ions. These then grow as a film on the substrate. The structure of the growing film can be influenced by the selected coating parameters and by the substrate temperature.



Electron beam evaporation uses an electromagnetically guided electron beam for the controlled evaporation of the surface of a metallic or ceramic coating material (ingot) in a crucible. The material in the gas phase condenses onto the substrate to a solid film. The layer structure in this process can also be influenced by the choice of coating parameters and the substrate temperature.



The foundation of today's W. C. Heraeus GmbH was laid in 1856 when the pharmacist and chemist Wilhelm Carl Heraeus melted platinum for the first time in quantities which were of industrial interest. Since this time Heraeus has again and again introduced innovations, made unusual technologies viable on an industrial basis and in doing so has developed into a competent partner for technical applications of precious and special metals.

PVD coating (Physical Vapor Deposition) is a vacuum supported process for the manufacture of metallic or oxide/nitride films, with film thicknesses up to about 5 µm. These are mainly functional films with special contact or corrosion protection properties.

If it is a question of manufacturing customer-specific surface coatings using the PVD process then W. C. Heraeus is your competent partner. Based on our long years of experience in the processing and finishing of metallic materials, our own target and ingot manufacture as well as the enormous diversity of coating processes we have at our disposal, W. C. Heraeus develops tailor-made and flexible solutions for the widest range of areas of application.

At W. C. Heraeus the following PVD processes are used

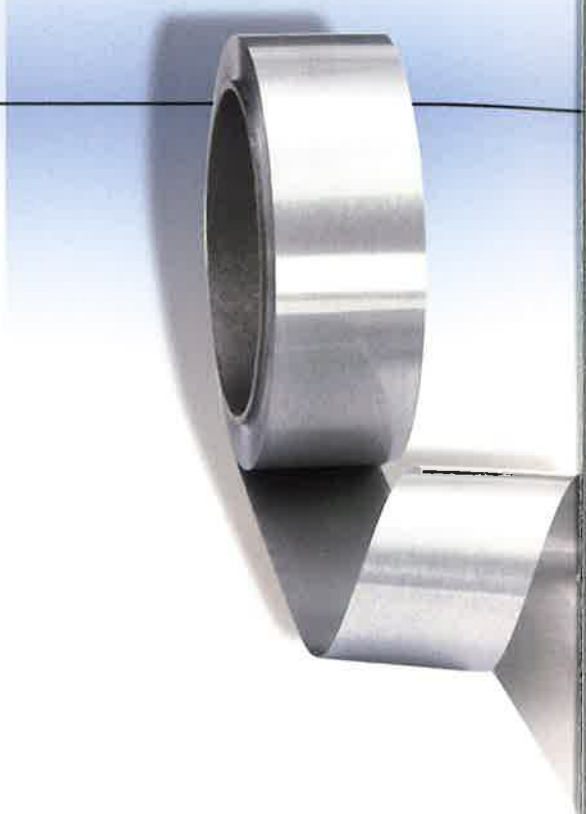
- **Metallic and reactive cathode sputtering**
- **Evaporation from resistance heated boats**
- **Electron beam evaporation**

Our versatility – application oriented solutions

Wire coating:
Gold bonding wires coated with alumina for wedge bonding at room temperature.

Rack coating:
Radiation windows of X-ray tubes are coated with an Al_2O_3 film.

Rack coating:
Cardiac pacemaker electrodes coated with TiN



Thin films are already used in a great many areas, such as the electronics industry, lighting technology and in medical technology – everywhere where massive and expensive precious metal parts can be replaced by coated components. The function of the coating can fulfil a great diversity of requirements. Examples of the possibilities are surfaces treated for oxidation protection, contact areas with low transient resistance and adherent layers for subsequent electroplating processes.

One of the important advantages of PVD coating is that the substrate is subjected to absolutely no chemical and only minimal thermal effects. W. C. Heraeus applies coatings of both pure elements and chemical compounds such as oxides, fluorides and sulphides.

Bulk goods and strip coating:
In order to improve contacting, weldability and corrosion resistance, strips and pins are coated for use in halogen lamps. Typical coating materials are all the platinum group metals.

PVD coated materials achieve excellent film properties: dense, homogeneous, ductile and adherent films even with material combinations which cannot be achieved using conventional methods. A great diversity of combinations between the substrate materials and the coating can be achieved in very high quality with single or multiple film systems.

The comprehensive quality assurance system meets the highest demands. Documented processes, regular film thickness controls in the series as well as the high purity and pretreatment of the materials used all ensure that the specifications are achieved.

The spectrum of coatable geometries and materials and the resulting range of applications are extremely diverse. Our flexibility, the expertise in precious metal and the availability of top quality precursor materials also enable W. C. Heraeus to carry out test projects in a small format and in small series – ideal conditions for the use of coatings in future oriented applications.

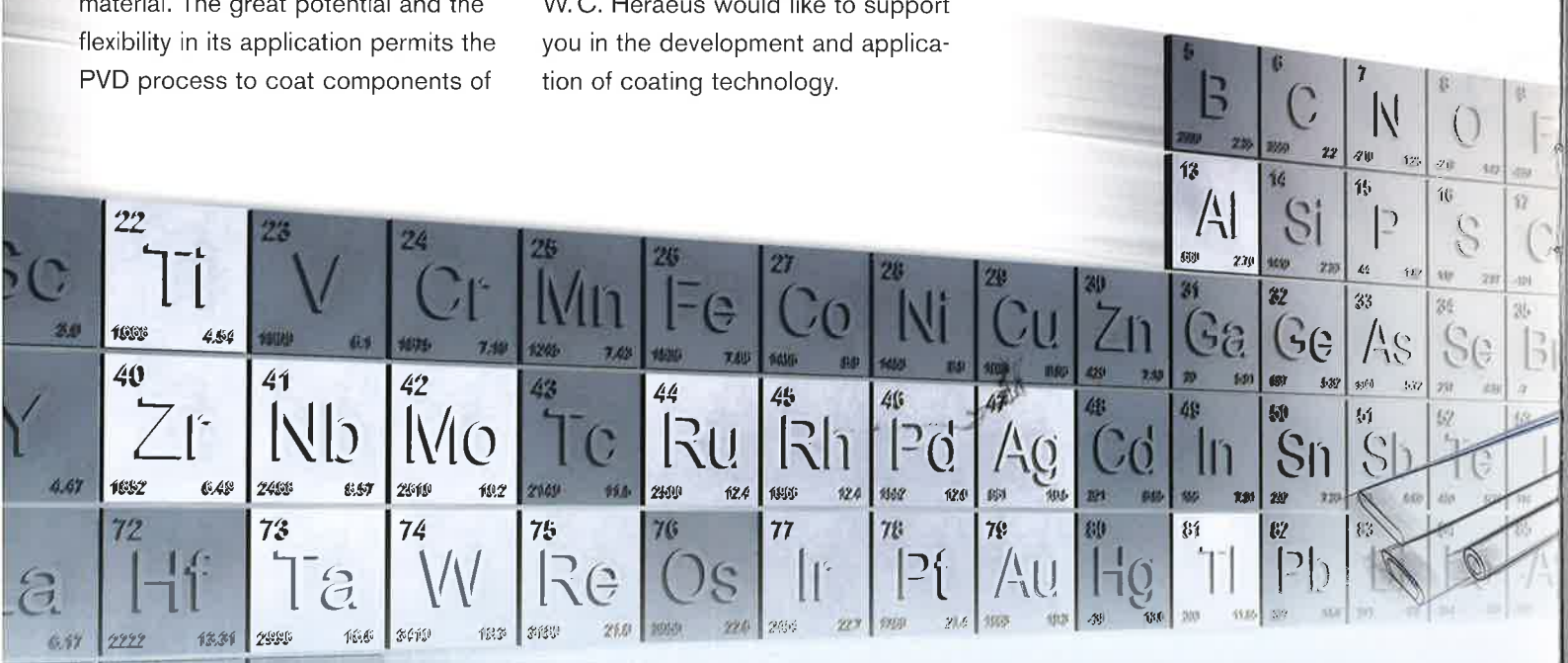
Coated strip is also used here: "Varius, complete tanning system from Original Hanau Sun Care"

Advantage through future oriented technology

Lowering costs, improving quality and conserving resources – the recipe for success is applying a high quality functional film to an economical base material. The great potential and the flexibility in its application permits the PVD process to coat components of various materials, geometries and compositions.

W. C. Heraeus would like to support you in the development and application of coating technology.

Please talk to us so that we can jointly find a solution for your requirement.



W. C. Heraeus coats base materials in various geometries, such as strips, foils, profiles, pins, wires, plug contacts or formed parts with precious and special metals as pure elements or in alloys or oxides.

W. C. Heraeus uses state-of-the-art processes for surface analysis in the development of customer specific solutions and for process optimisation.

Optical microscopy
Metallographic sections and their evaluation under the optical microscope make it possible to assess the film structure and thickness.

X-ray fluorescence analysis
Measurement of film thickness and material analysis by the X-ray fluorescence technique.

Scanning electron microscopy (SEM) and X-ray microanalysis
Scanning electron microscopy enables images of the topography with very high enlargement. The integrated energy dispersive (EDX) and wave-length dispersive (WDX) X-ray analysis permit point, line and area chemical analyses.

Scanning Auger microanalysis (AES)
This method permits the analysis of the atomic composition of surfaces and thin films.

Secondary ion mass spectroscopy (SIMS)
Due to its high sensitivity SIMS permits the detection of extremely small concentrations (ppm) of an element on the surface of a solid.

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