

The process and technology of TOPOCROM®

TOPOCROM® is a galvanic, electrochemical coating process for producing structured chromium layers. The proven reactor-coating process provides innovative and effective solutions for the industry.

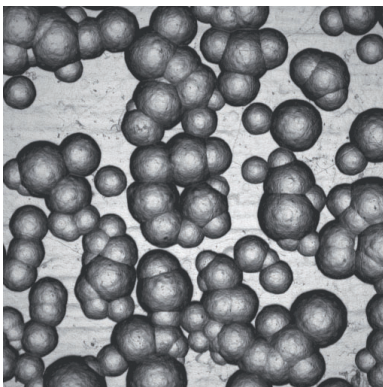
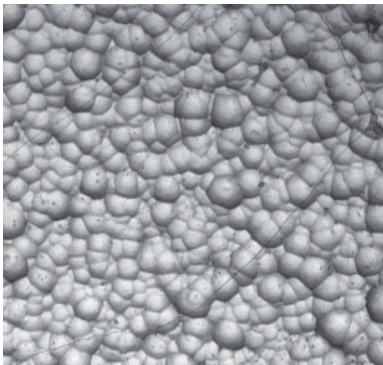
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Chromium layers with surface topography

With the TOPOCROM® coating technology, structured accurate and reproducible chromium layers and layer systems can be deposited with a specific surface topography onto metallic components, as well as with novel functional properties for protection against wear and corrosion.

Hemispherical surface structure

TOPOCROM® layers exhibit a hemispherical surface structure. The size of the structural elements and the degree of coverage and thus the density of the spherical layer structure can be varied thanks to the procedure.



Typical TOPOCROM® surface structure (top: closed structure; bottom: open structure).

Precisely adjustable surface properties

The process enables characteristics such as surface roughness and the number of peaks or contact areas, as well as mechanical, physical and chemical properties such as hardness, residual stresses or the number of cracks, to be varied over a wide range and adjusted exactly and reproducibly for your specific application.

High demands on the coating technology

The requirement profiles make the highest demands on the coating technology. The deposition of the TOPOCROM® layers occurs by the eponymous process in a reactor. Only through this special process and plant technology – developed in-house by TOPOCROM® – can all the desired properties be achieved. The special combination of process, procedure and system technology leads, in this technology, to layers and layer systems with the required properties and allows the quality requirements of the industry to be fulfilled:

- Very high dimensional accuracy
- Uniformity across the workpiece
- Targeted set properties
- Reproducibility

Process technology

The basis of TOPOCROM® coating technology is the deliberate use and control of nucleation processes in galvanic chromium deposition and the precise control of the growth processes of these nuclei. This enables structured, hemispherical chrome coatings with reproducible density and size of structural elements to be generated. Structure formation and structure growth can be influenced and controlled by physical parameters.

Hardness, corrosion resistance, wear resistance as important characteristics of TOPOCROM® layers.

Physical and chemical properties of chromium layers

- Symbol Cr
- Density 7.1 g/cm³
- Melting point 1765 – 1950 °C
- Hardness 950 – 1150 Vickers
- Colour silvery bluish-white
- Normal electrode potential Cr active - 0.71 V (base)
Cr passive + 1.36 V (noble)
- Chromium oxide is formed on the chromium surface and, through its passivity, the potential is shifted.
- Chromium coatings are resistant to most gases, acids, alkalis and salts.
- Sulphuric acid, H₂SO₄, and hydrochloric acid, HCl, attack chrome coatings.

Ensuring quality

In developing the TOPOCROM® technology, attention was paid, in particular, to the quality assurance and reproducibility aspects. The entire procedure and process flow is specified in the master computer and is fully automatic. In this way, all the important process parameters are monitored, regulated and documented – in the interest of quality, safety and ecology.

Wastewater and emission-free plant technology

TOPOCROM® coating is carried out in a closed coating reactor, a proprietary development of the Swiss company Topocrom AG. The electrolytes neces-

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sary for the coating are stored underneath the reactor in closed process containers.

- When the process starts, the components to be coated are introduced into the coating reactors.
- The reactors are then closed.
- The reactors are continuously supplied with chrome electrolyte via a special distribution system (pumps, pipes and valves) from the closed process containers.
- During the chrome plating, the electrolytes are pumped from the two closed process containers tanks into the reactors and then feed back into the process containers.

The process is fully automatic and computer controlled. Process profiles and parameters are stored. The defined coating process can always be executed again. This ensures exact reproducibility of the desired surface every time.

The TOPOCROM® system engineering, which is built as a closed unit, satisfies both the strict legal requirements and the highest standards in terms of environmental protection and occupational safety. All environment-relevant system and process engineering is monitored and checked continuously.

TOPOCROM® systems engineering functions without any effluent or emissions. Rinsing water (recycled) is fully recycled to the the electrolyte. Emissions extracted from the reactor and storage tanks are cleaned and washed before they enter the environment.

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