«Only dead fish go with the flow.»

P.-F. Chauvy, CEO micropat SA

Micropat SA vision is to promote the use of metallic micropatterned surfaces.
Our extremely precise, 3D-compatible, engraving technique fulfills the specific needs of a variety of domains such as plastic injection molding, decoration, biomedical applications, microfluidics and scientific research.

Metal engraving to a new excellence

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2.

1. Microfluidic circuit (60 µm wide channels) engraved on a steel plate.

2. Decorative «Double image» engraved in stainless steel.

3. SINUSURF project: stainless steel 3D sinusoidal surface (interferometric measurement (LAMIH, University of Valenciennes, France), 100 µm period & 10 µm amplitude).

Electrochemical micromachining

Micropat SA excellence consists in a very high precision metal engraving electrochemical technique (ECMM). We focus on R&D and technology transfers, while offering a job shop service to manufacture prototypes and high-end small series.

We routinely work with most stainless steels, various tool steels and titanium (grade1-4), as well as other «exotic alloys» such as NiTi.

Hemispherical cavities or cylindrical channels (Ø 30 to 300 µm) are etched with a positioning and dimensional accuracy in the µm range.

ECMM technology is well adapted for processing both flat substrates and more complex 3D-shape objects. Directly performed on bulk metallic parts, it offers the unique advantage to be easily combined with mechanical machining. Large scale geometries are created by milling and micropat SA provides a finishing step with the engraving of micro features. Plastic injection molds microstructuring is a perfect illustration of our capabilities.

Scientific applications

ECMM is particularly interesting for the fabrication of microfluidic circuits (cf. image 1). This direct machining methodology is well-suited to titanium high-pressure microfluidics used in chromatography. Moreover, ECMM provides an ideal solution for the realization of microfluidic circuits on steel master plates, which are subsequently mirrored by nickel electroforming to obtain submasters used for large-scale production of polymeric replicates.

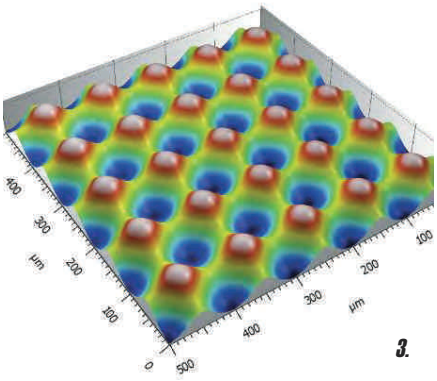
From a metallurgical point of view, the technique leaves the material properties unaltered: no oxidation, no darkening, neither loss of corrosion resistance is induced. The metallic surface is left in a passive state without residual stresses. We take advantages of these features for manufacturing very thin stress-free metallic membranes for scientific applications.

Considerable replication ease and exceptional topographical control enable micropat surfaces to perform as high-quality standards in fundamental sciences, such as tribology, fluid dynamics and cell biology (cf. image 3).

Unique decorative features

A further advantage of ECMM in comparison to laser machining, chemical etching, electric discharge machining or micro milling is the incomparable smoothness (measured residual roughness Ra well below 25 nm) allowing for a very high reflectivity of the engraved structures.

Over the years, we have developed extensive know-how and special programming tools to take advantage of the decorative capabilities of such engraving process. Well-tailored graphic patterns create aesthetic optically variable images, with appearance changing with the viewing direction (cf. image 2). In conjunction with polymer injection or elastomer compression molding, this technique offers a unique solution for demanding decoration needs of the watch industry.



3.

Network-enhanced innovation

We are proud to be well integrated in an international and transdisciplinary network of partners enabling us to constantly develop our processes and address new domains of applications. The PIMENT project is a good illustration of such collaboration. This Interreg consortium is composed by the CSEM (Neuchatel) and micropat SA on the Swiss side and by the IPC (French technical center for Plastic and Composites, Bellignat) and VUILLERMOZ Philippe SAS (high precision machining, Saint-Claude) as French partners. In the framework of this project we realized molded micro/nano-structured demonstrators targeting the watch industry and the biodiagnostic field (cf. page 73). The PIMENT results went beyond expectations and we are pleased to announce the kick-off of a follow-up Interreg project (code name HARISSA) with an extended consortium.

Definitely collaboration plays a key role in the success of micropat SA.

www.micropat.ch