
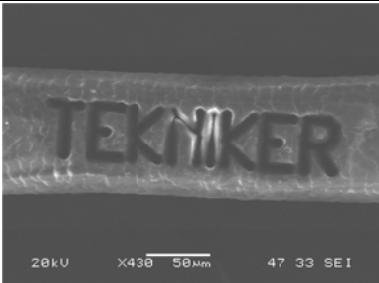




Micro Nano Patterning

ULTRA LAB – Ultraprecision machining

Fundación TEKNIKER, Spain



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Material class:	Silicon	Polymer X	Metal X	Ceramic X	Glass	Organic	Other
Short technology description:	Capability to machine freeform surfaces in a wide range of materials including metals, polymers and ceramics, using: <ul style="list-style-type: none"> – micromilling – diamond turning – micro EDM and thin WEDM – femtosecond-laser machining with micron and submicron resolution 						
Typical structures and designs:			Still microgears machined by m-EDM with wire of diameter $\varnothing 0.030$ mm				
			Femtosecond-laser ablated human hair				
			Drug delivery system <ul style="list-style-type: none"> – Micromilled steel mold and microinjected device 				
			Microheat exchanger <ul style="list-style-type: none"> – Micromilled channels in Aluminium 				
Special features:	<ul style="list-style-type: none"> – 3D parts/cavities possible by micromilling – Low repeatability for features $< 20 \mu\text{m}$ – Typical tolerance $\pm 3 \mu\text{m}$ – Roughness $< 0,8 \mu\text{m Ra}$ 						

Limitations, constraints:	<ul style="list-style-type: none">- Not possible undercuts- Clamping systems critical for good accuracy- Presence of burrs in micromilling- EDM only for conductive materials- Not appropriate for serial production- Critical dimensions driven by cutting tool sizes
Material examples:	<ul style="list-style-type: none">- Most of the applications oriented to the fabrication of metallic moulds and cavity inserts- Flexibility for prototypes production- No limitations in type of material for femtosecond laser machining