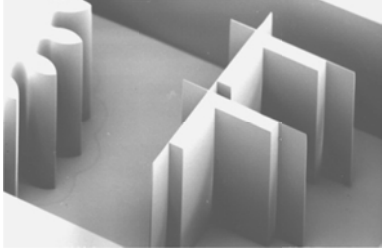
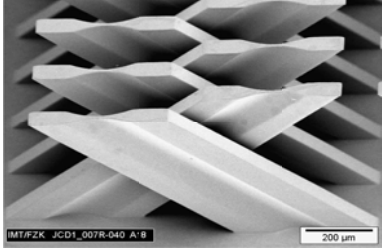




Micro Nano Patterning

Direct X-Ray Lithography

Karlsruhe Institute of Technology (KIT), Germany



Contact:	Dr. Martin Börner Email martin.boerner@kit.edu • Phone +49 (721) 608-24437 • Fax 49 (721) 608-24331						
Material class:	Silicon	Polymer X	Metal (X)	Ceramic	Glass	Organic	Other
Short technology description:	Deep X-ray lithography uses synchrotron radiation to pattern thick PMMA layers (thickness: several microns up to several millimetres) in order to achieve high aspect ratio microstructures (aspect ratio up to 50). The structures are characterised by very steep sidewalls (slope angle better than 1 mrad) and sidewall roughness in the range of 20 to 30 nm. For optical applications usually micro-optical benches with cylinder lenses, prisms and fixing structures for other optical components are fabricated. The structures are either used as prototypes, as lost form for metal replication or as moulds to fabricate mould inserts.						
Typical structures and designs:			500 µm high PMMA structure (width of the small bar: 5 µm)				
			Crossed X-ray lenses (SU-8)				
			Gear wheels and anchors made out of Au (99%) and Ni/Co alloy				
			Micro-optical bench with cylindrical mirrors and fixing structures				
Special features:	<ul style="list-style-type: none"> – Aspect ratios up to 50 – Structural height up to 2 millimetres – Structural details less than 1 µm – Slope angle better than 1 mrad 						
Limitations, constraints:	<ul style="list-style-type: none"> – PMMA and SU8 (in case of prototyping) – Min. process duration for prototyping due to mask fabrication (6 to 8 weeks) 						
Design rules:	<ul style="list-style-type: none"> – Rounding of structural edges (radius > 5 µm) 						