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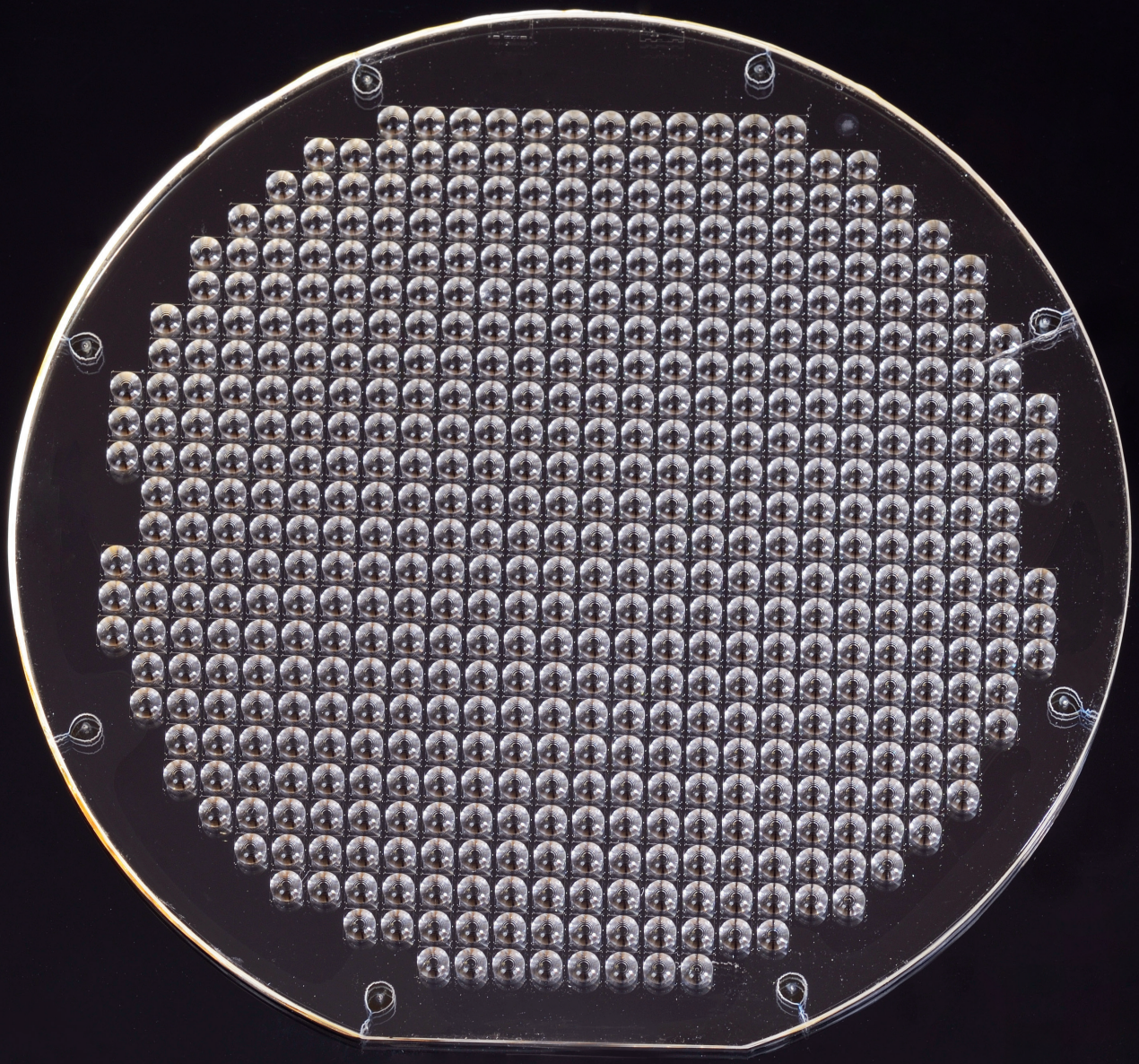
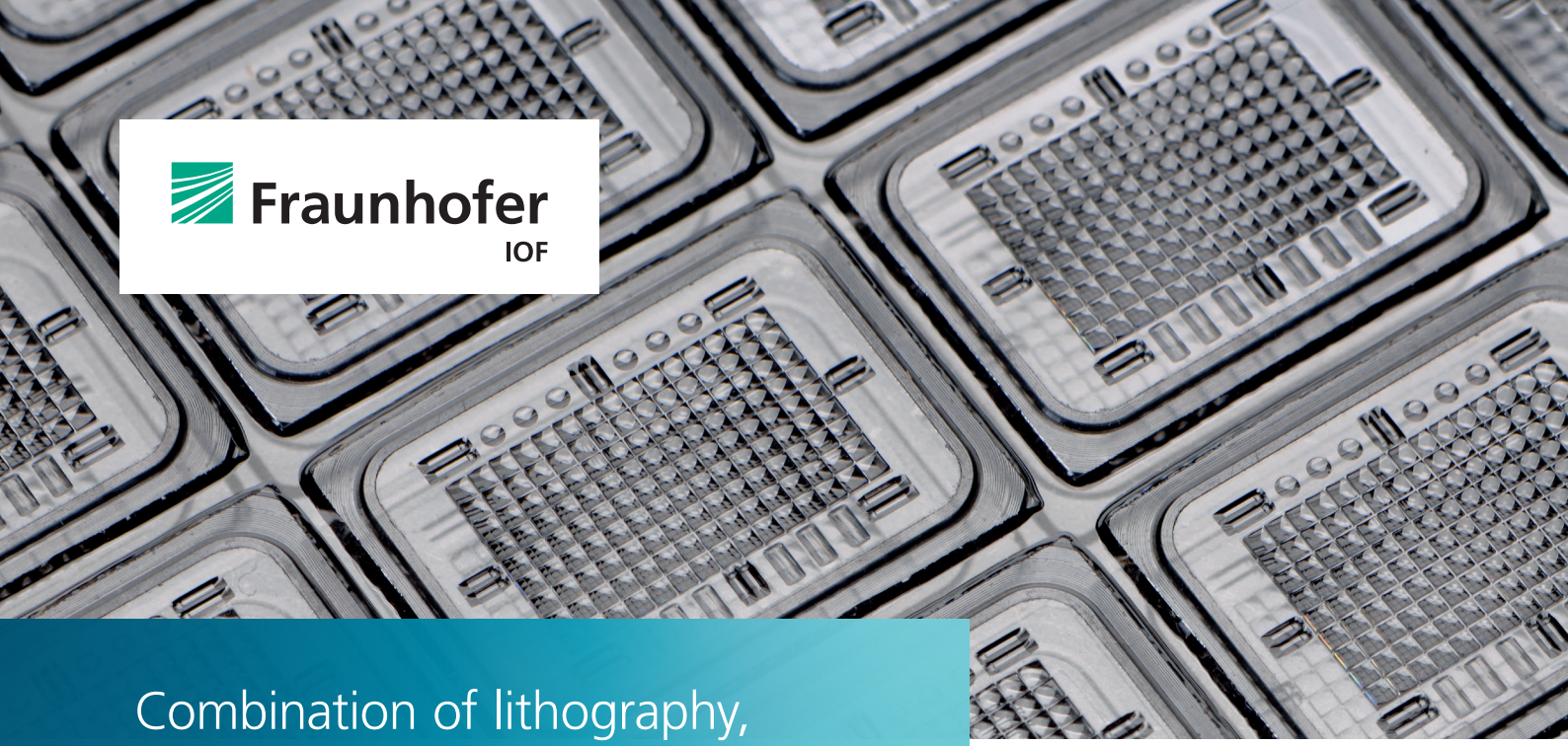


Combination of lithography, dry etching and replication



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Combination of lithography, dry etching and replication

Cover: Fresnel lenses in fused silica by RIE of a polymer replication.

Top: Closeup of a region of an array master wafer of refractive freeform microlens arrays fabricated by Step & Repeat replication process, molded into ORMOCOMP.

Proportional reactive ion etching (RIE) transfer of reflow photoresist structures is a well-established microlens fabrication technology. Interesting additional features can be generated by a suitable combination of this technology with polymer replication.

Concave microlenses in SiO2 and Si

Reflow photoresist structures are typically convex, but the surface can be inverted introducing an additional polymer replication step. Accordingly, the inverted lenses can be transferred to the subjacent silicon or glass substrate. One example is the generation of precise concave mirror arrays in silicon.

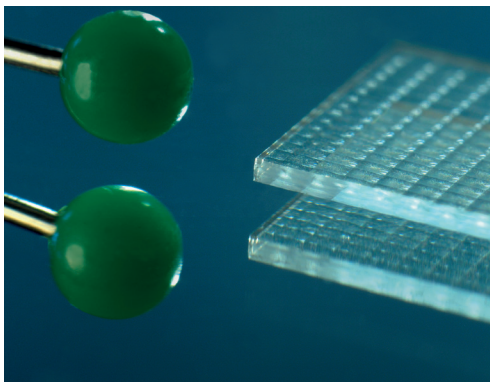
Mastering of aspherical lenses

The surface of photoresist reflow lenses is typically spherical. A desired aspherical (elliptical, parabolic) profile can be achieved using a suitable RIE transfer process. The generated structures can serve as a master in a subsequent replication process.

Lens arrays with 100 % fill factor

Typically, the fill factor of standard photoresist reflow lens arrays is reduced by the packing density of circular lens apertures and by the resolution of photolithography. Because of its isotropic etching behavior, a subsequent RIE step can influence the fill factor.

This enables e.g., the generation of hexagonally packed lenslets with 100 % fill factor which can again serve as a replication master structure.



RIE transferred lens array in glass.

Contact

Department
Micro- and Nano-structured Optics

Scientific Group
Advanced Microoptical Components
Dr. Peter Dannberg
Phone +49 3641 807-420
peter.dannberg@iof.fraunhofer.de

Fraunhofer IOF
Albert-Einstein-Strasse 7
07745 Jena
Germany
www.iof.fraunhofer.de

www.
more info