Zertifiziertes Management-System
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EFG Berlin

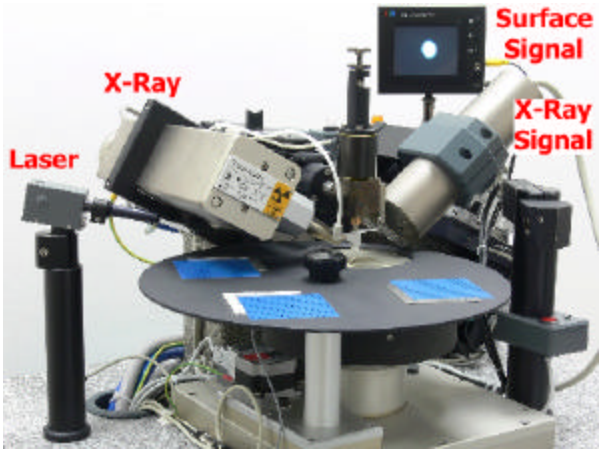
New Development in 2005:

High-Performance Quartz-Wafer Topography

With the development of the ***X-Ray Semi-Automatic Quartz-Wafer Machine (QW30L)***, EFG has successfully created a combination of a full-fledged 2-D surface mapping device and the unsurpassed precision of the Ω-scan method, which is highly acknowledged by our many world-wide customers. Thus, for the first time it is now possible to elucidate the high-precision crystal lattice orientation with respect to the specimen surface at a spatial resolution of down to 1 mm.

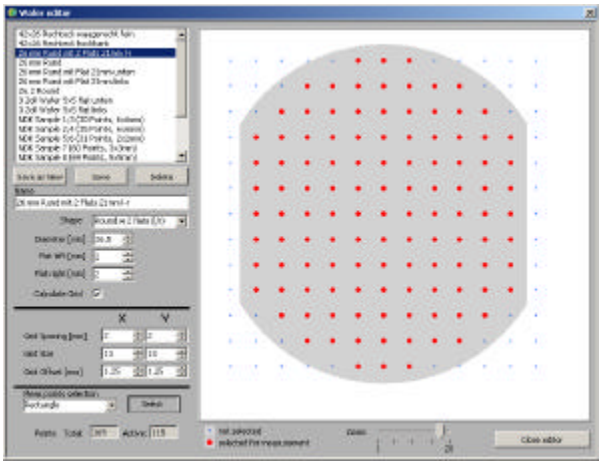
X-ray and laser are doing the work

Using the Ω-scan method [1], the x-ray beam hits the rotating sample at a certain incidence angle in the axis center, giving rise to two reflections. From the angular separation the crystal lattice orientation can be derived at the precision of seconds of an arc. During an x-ray measurement, the laser surface signal is analyzed to obtain the so-called wobble correction. The time of measurement per single point is less than 2 seconds.



Versatile mapping

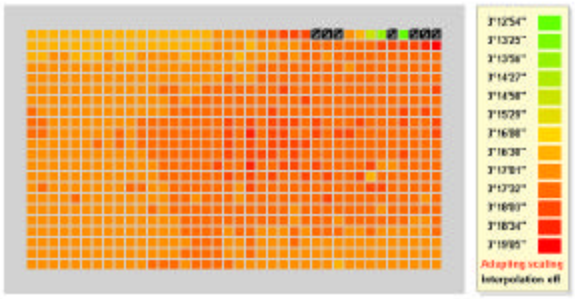
Using the user friendly wafer editor, a variety of wafers of different shape, size and thickness can be measured. Raster resolution is better than 1 mm at an absolute position error of ~ 0.1 mm. There are three wafer loading areas, where wafers have to be placed manually. Wafer transport to the measurement table and returning the wafer are performed by the machine using stepper motors and under-pressure suction.



Customizable presentation of results

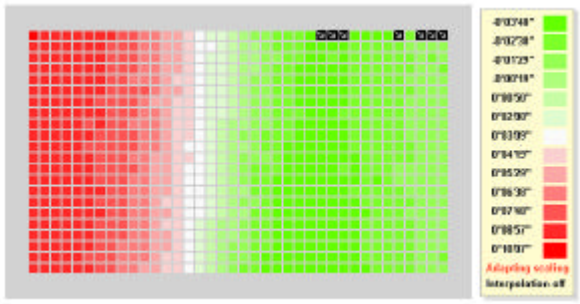
AT-cut

The map was obtained from a quartz wafer measured in the 3° mode. Significant deviations from the mean angle are observed close to the edges. The broad laser signal sometimes causes problems (marks= faulty measurements) when too close to a border.



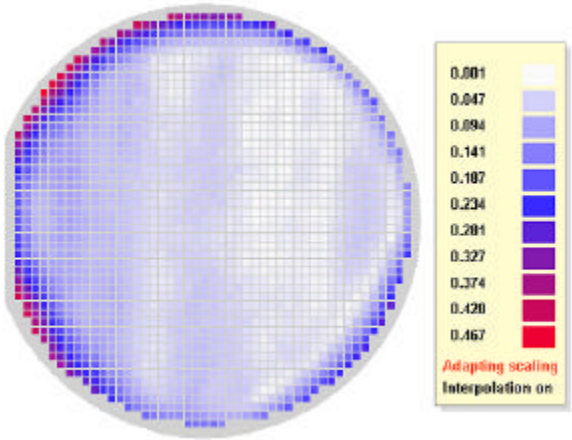
X-cut

In this example, the deviations from the reference cutting angle are sigificant and are in the range from ca. –4‘ to +10‘.



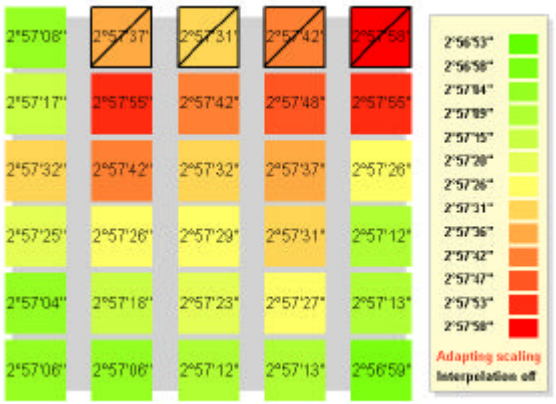
Rho-las

For other materials than quartz, from the laser spot position and size a number of surface related features can be obtained. Rho_las is related to a certain lattice-to-surface angle. Large values may indicate lattice misorientation or a surface tilt off the local mean sample surface. The map shown to the right suggests rounding of the wafer edges probably due to lapping.



Numeric results

Numeric values can be imposed on squares representing measured points. A variety of customization features are available. Generally, results are available on-screen but can also be obtained in printed form.



[1] H. Berger: “X-ray Orientation Determination of Single Crystals by Means of the ? -Scan Method”, J. Phys. IV France 118, 37-42 (2004).

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http://www.efg-berlin.de
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