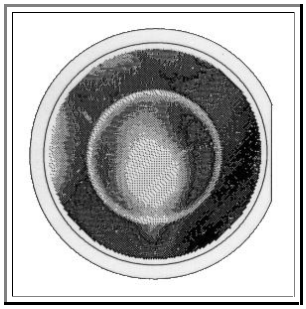
D-Defects Detected by ELYMAT Technique

Advanced

- With the ELYMAT (a special technique to map minority carrier lifetime in **Si**; see the publications in the link), **D**-defects and other microdefects in **Si** can be "seen" in some cases because they decrease the minority carrier life time (they act as recombination centers).
  - The pictures obtained monitor the local photo current (induced by a scanned Laser beam) in special electrolytic junctions. It is a direct measure of the minority carrier life time. A typical picture of state-of-the-art as-grown **150 mm Si** wafers from around **1990** is shown below. Bright areas correspond to decreased life times.



  - The most outstanding feature is the well-defined ring. It is due to small defects incorporating **SiO_2**.
  - With hindsight gained by much research in the nineties, the situation is as follows: Inside the oxygen-precipitate ring, small vacancy agglomerates (in the form of octahedral little voids) dominate; outside the ring, interstitials agglomerates (probably in the form of small stacking faults and dislocation loops (the old "classical" swirl defects)) were formed.
- This rather unique defect pattern is the result of the complicates interaction of three main point defects: vacancies, **Si**-interstitials and **O**-interstitials. Whereas the above interpretation is now universally accepted, the details about the primary defects are not yet known beyond reasonable doubt.
  - For a recent review read the paper of Bob **Falster** and V.V. **Voronkov**.