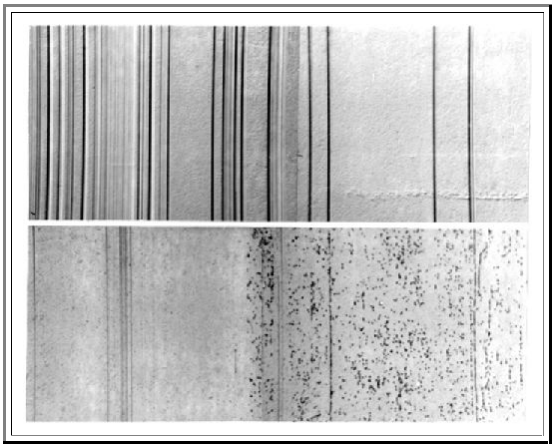
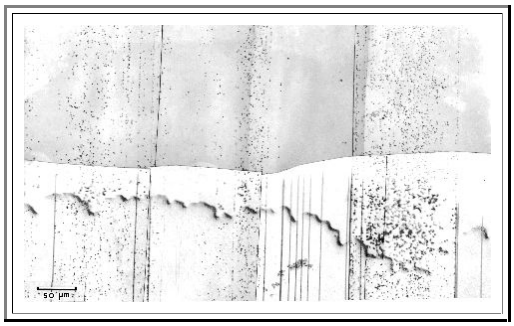
Anodic Etching of Defects in Silicon

Illustration

- The differential etch rate during anodic etching depends on the current density. At small current densities, defects may etch much faster than perfect Silicon; anodic etching than reveals the defects very clearly.



- Shown are adjacent areas of a **Si** specimen that was grown for solar cell applications. It contains many grain boundaries, preferably twin boundaries, and dislocations.
  - The upper pictures was obtained after etching with a rather large current density. Only grain boundaries can be seen; but this may be due to steps between different grains because the etching rate depends on the grain orientation.
  - The lower picture shows the area etched with low current densities. Many grain boundaries are no longer visible (despite the fact that we know they must be there), but a large number of dislocation etch pits is visible.
- Comparing anodic etching with chemical etching gives a similar result:



- The upper half of this sample was anodically etched, the lower with a purely chemical etch (**Secco-etch** in this case).
  - Evidently the anodic etch does not show *some* grain boundaries. From other experiments it became clear that anodic etching under these condition shows only *electronically active defects*, i.e. defects that influence electronic properties, especially the carrier life time.