Pictures to: 5. Siemens Research Munich

5.1 Solar Cell Research

First, some of the pictures in article 56: "The S-web technique for high-speed growth of Si-sheets" plus some auxiliaries. Note the Captions for Figs- 7 and 8 are interchanged. I give you the correct captions with the figures

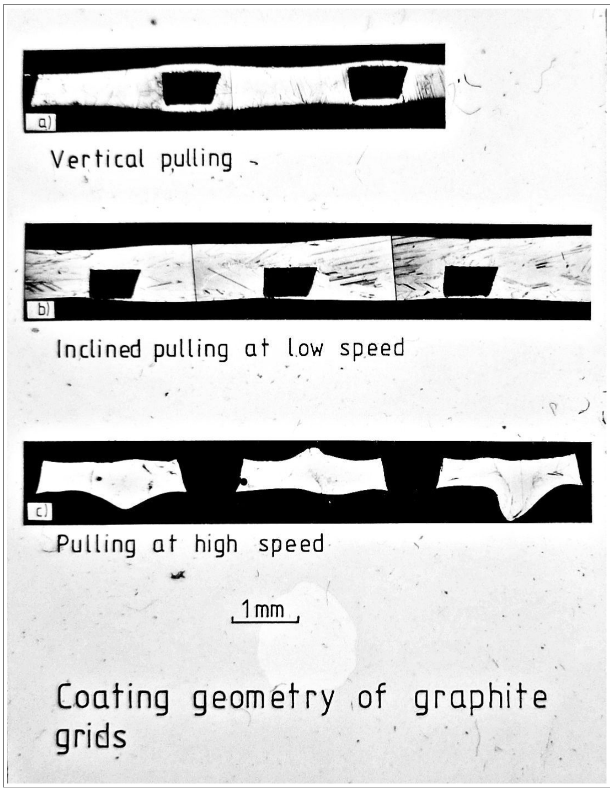


Fig. 1 in publication 56
Also used in various reports

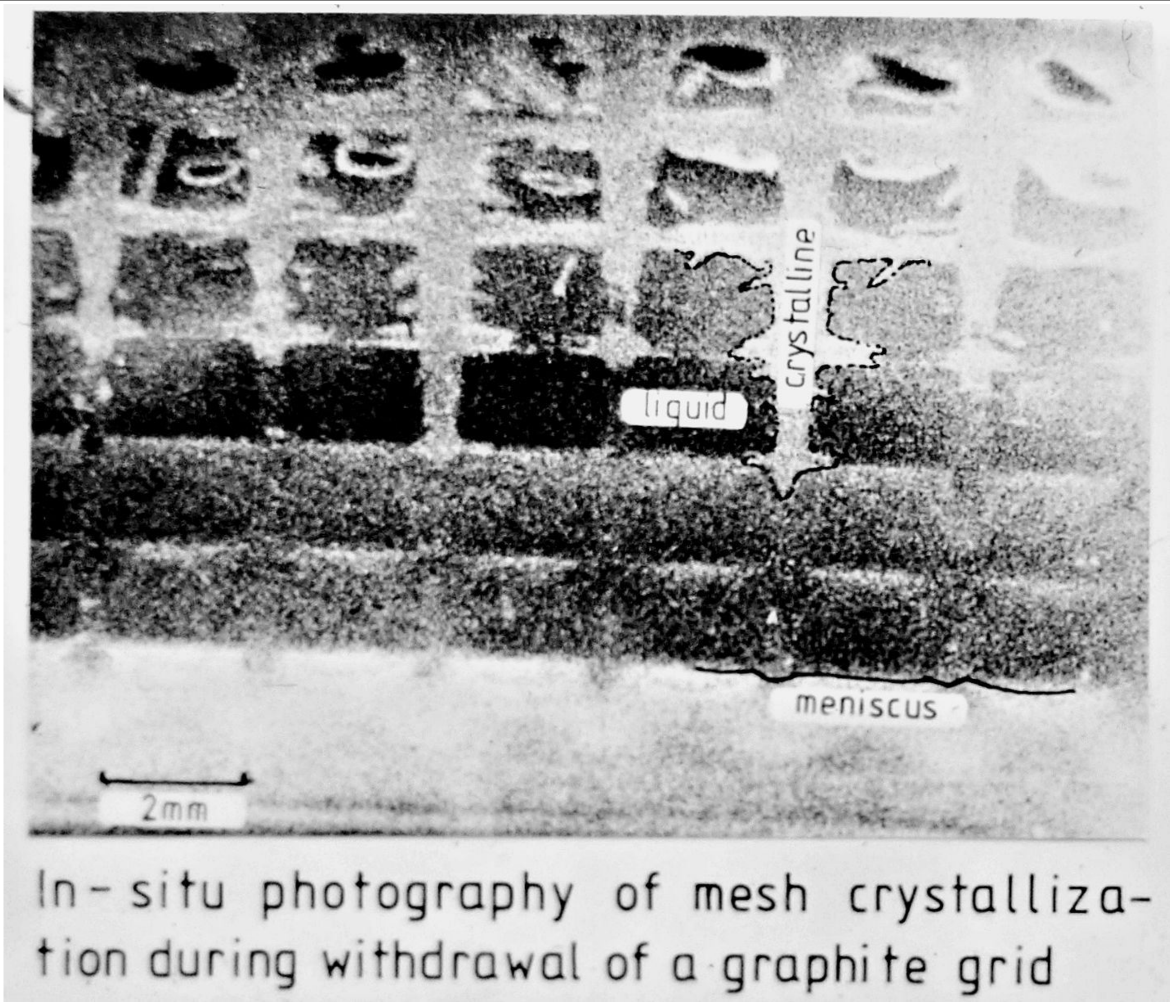


Fig. 3 in publication 56
Also used in various reports

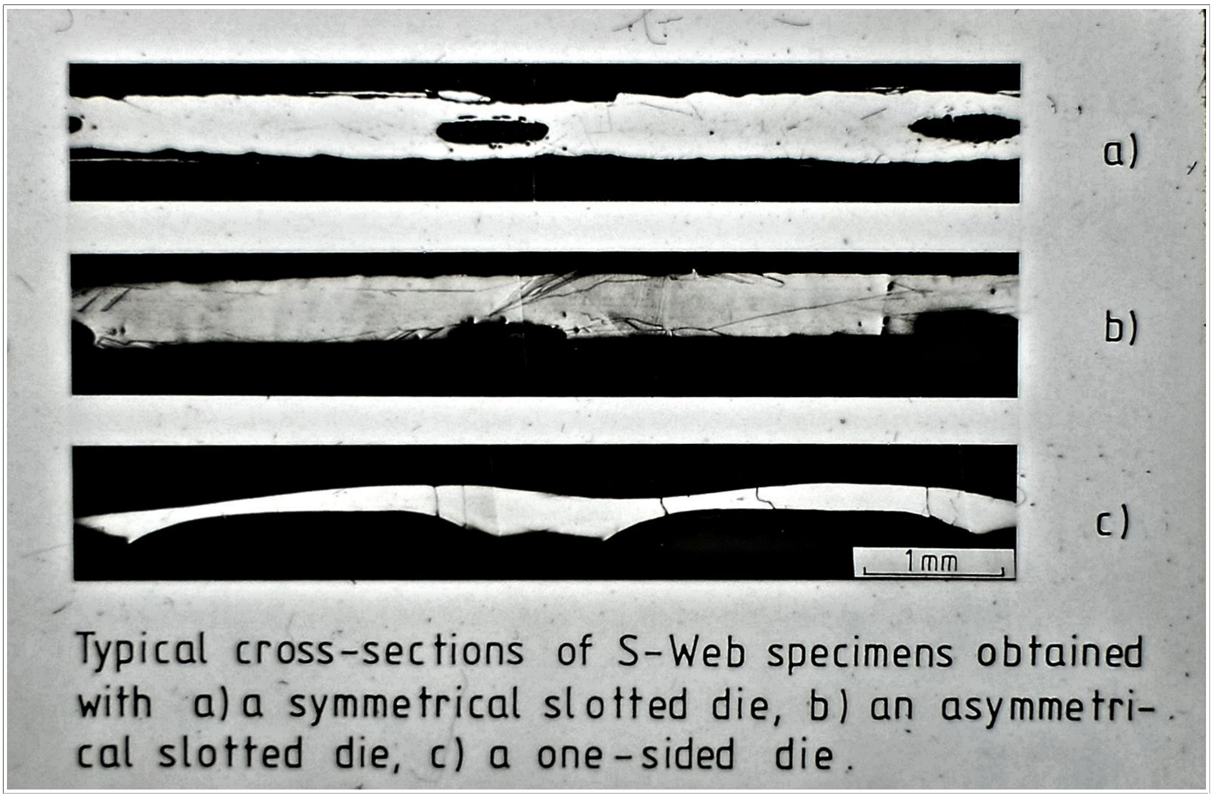


Fig. 5 in publication 56
Also used in various reports

The pictures from the full paper (ref. 22) follow

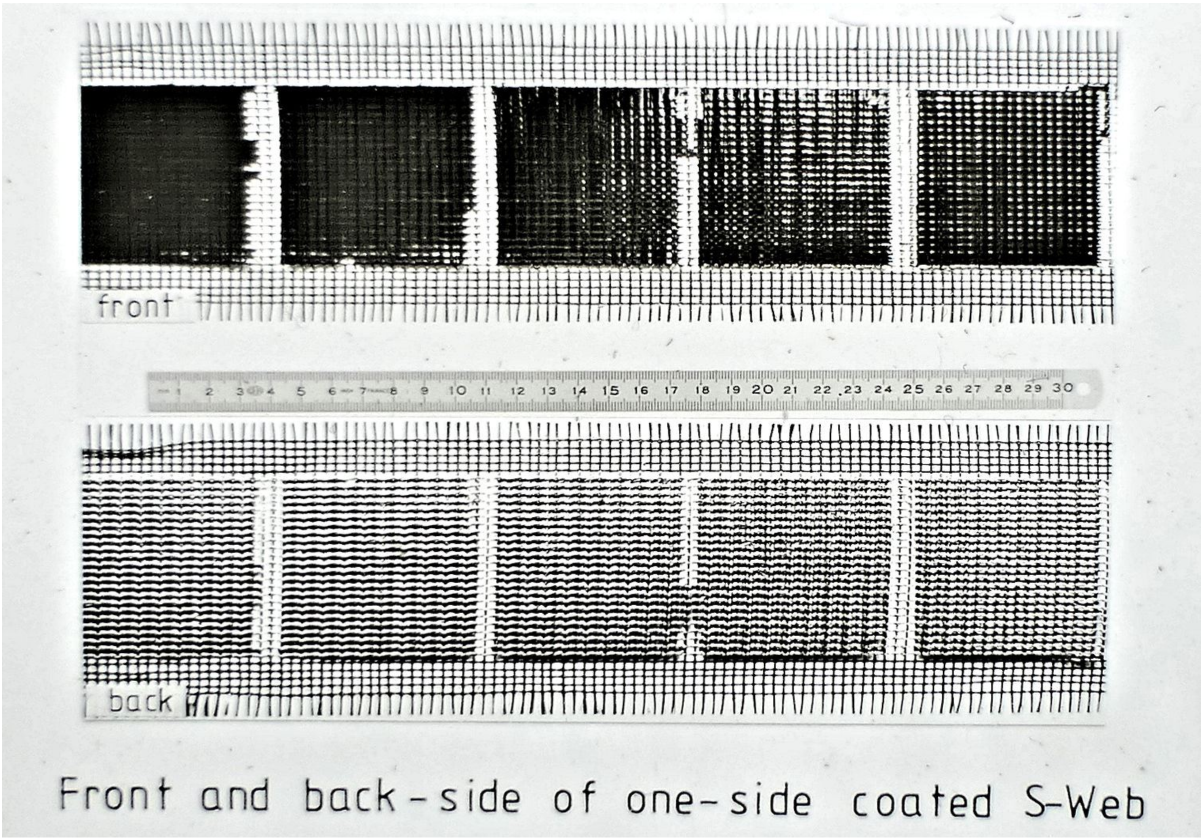
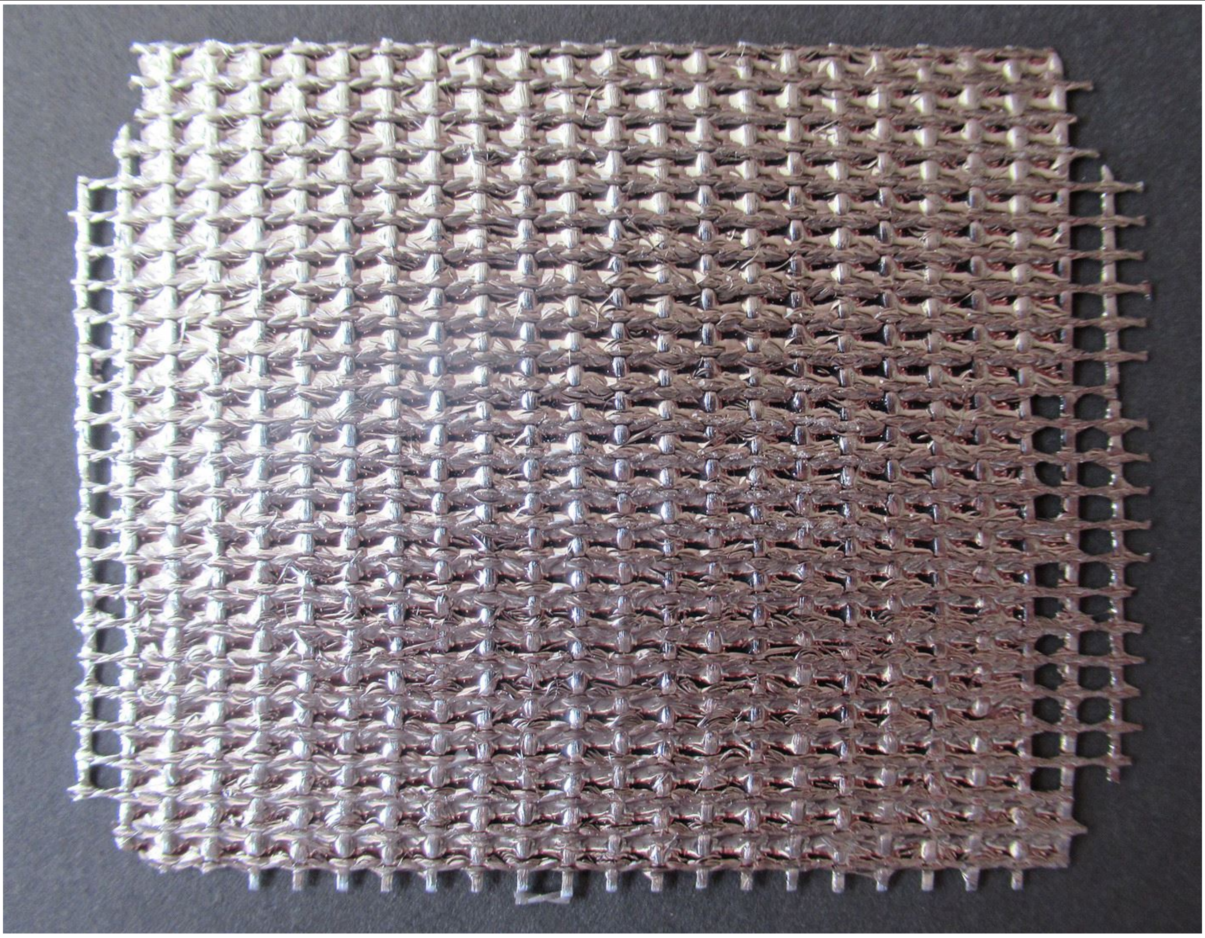
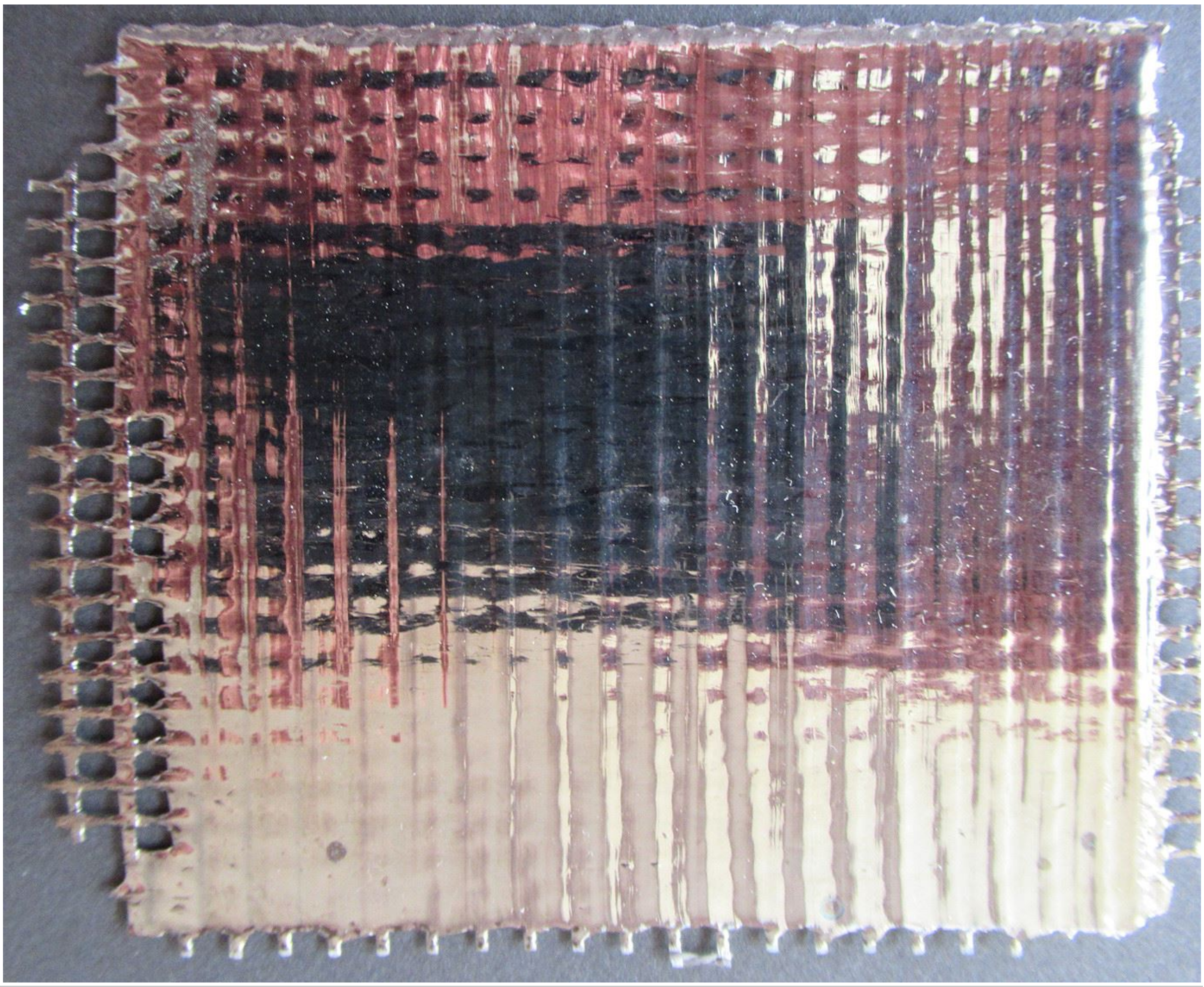


Fig. 6 in publication 56
Also used in various reports

I still (in 2024) own one piece of this (or a similar) S-Web. It may well be the last survivinfg S-Web example. Here are (bad) pictures.





The last survuvuing S-Web (?)

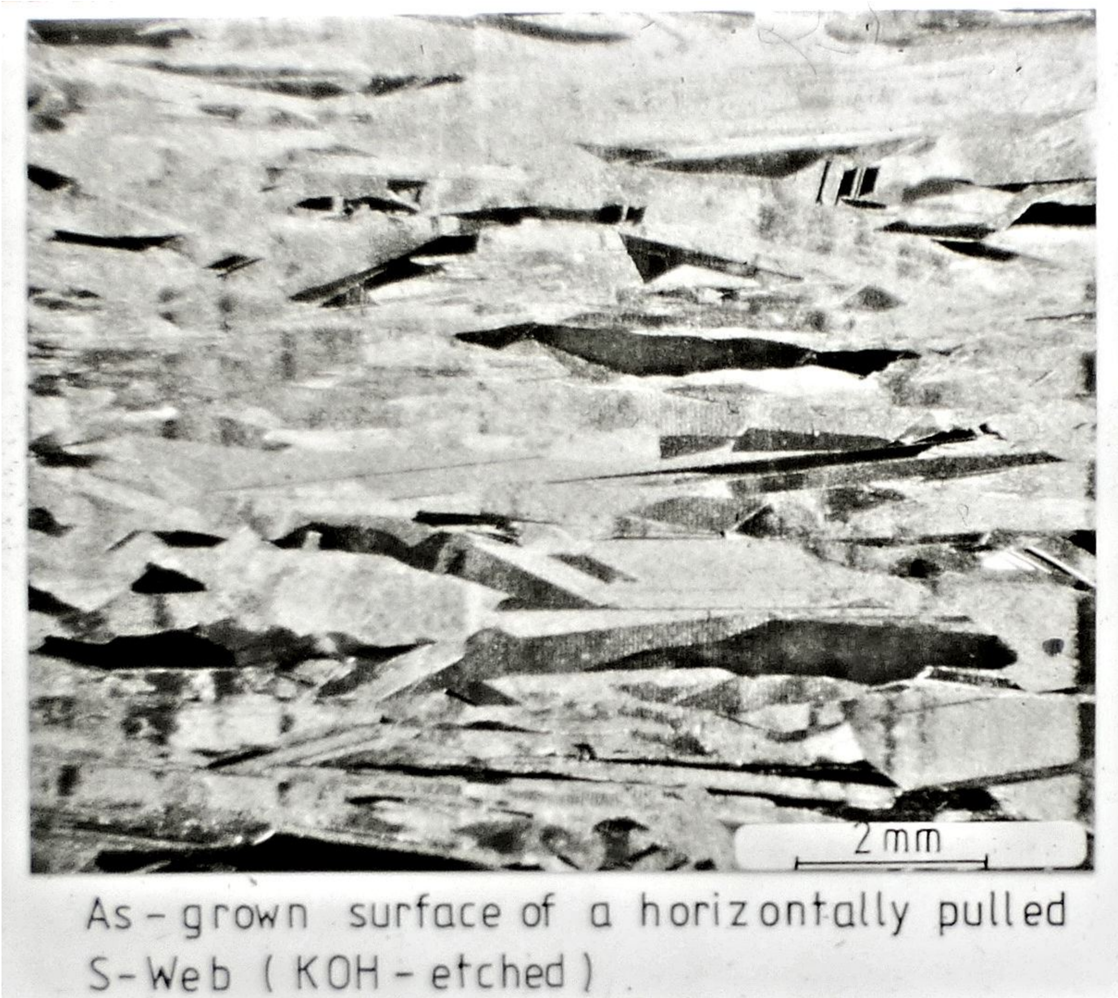


Fig. 7 in publication 56. Wrong figure caption there
Also used in various reports

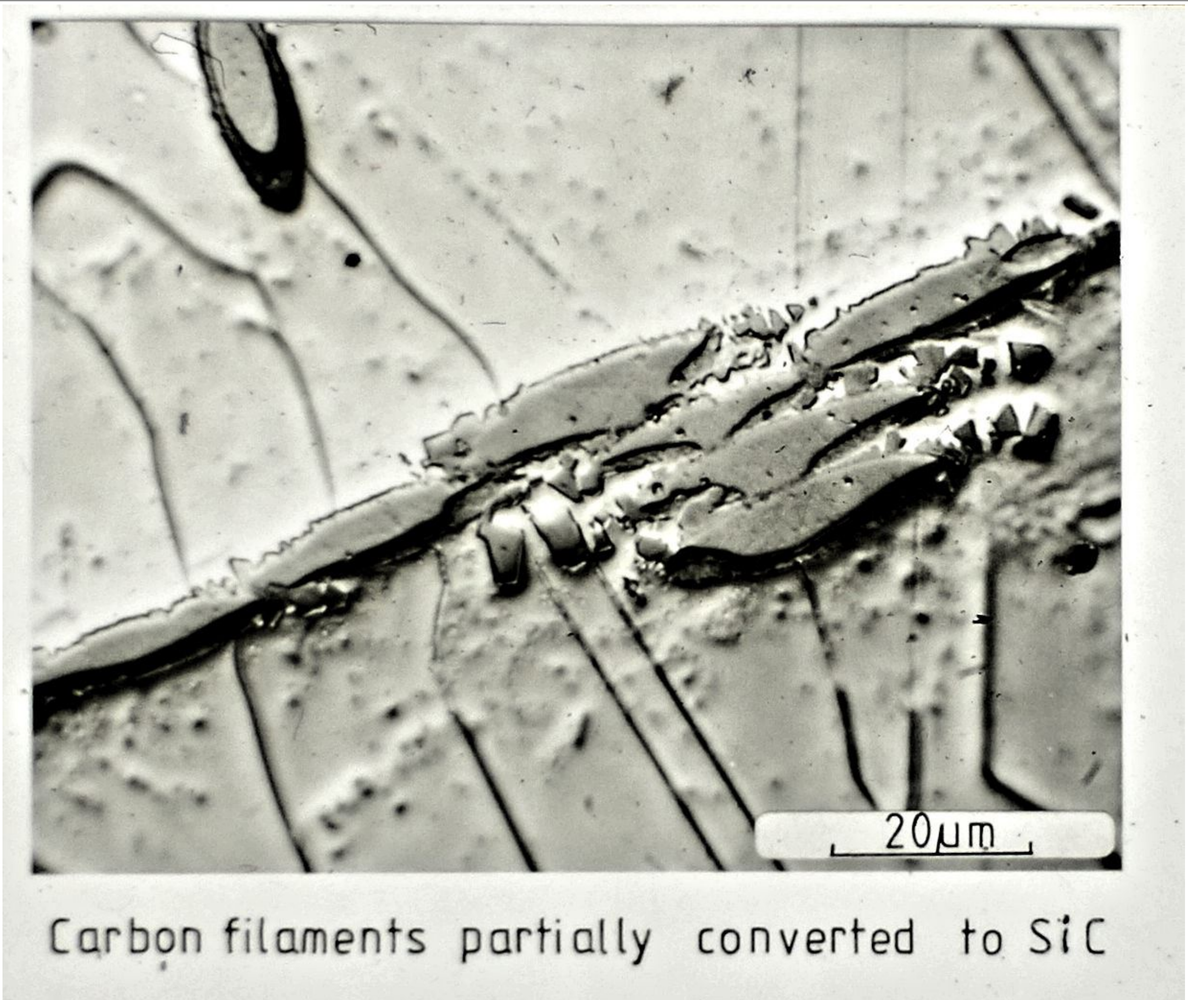


Fig. 8 in publication 56. Wrong figure caption there
Also used in various reports

Now the pictures for article 55: A high-speed characterization technique for solar silicon"

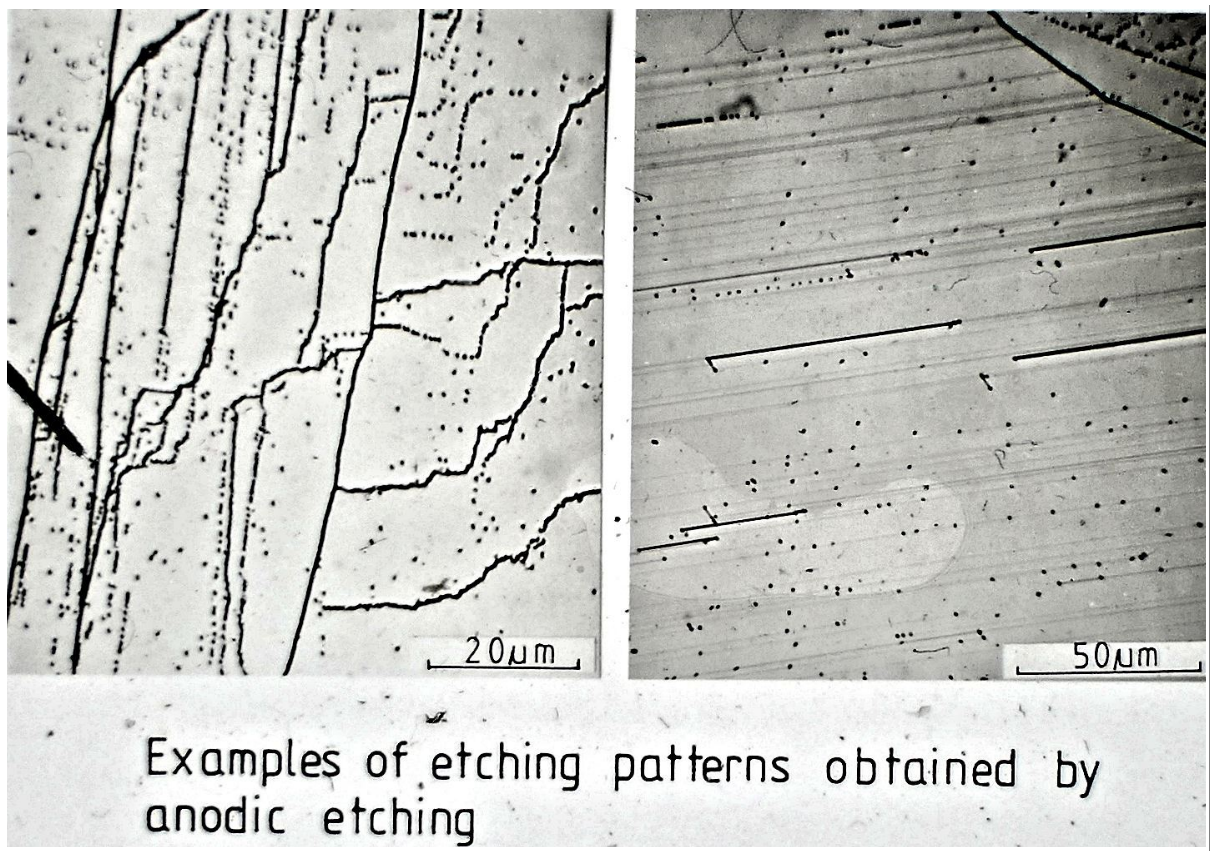


Fig. 3 in publication 55
Examples of etching-patterns obtained by anodic etching. The right-hand micrograph demonstrates pronounced differences
in the etching behavior of twin-related boundaries most likely related to differences in the electronic activity of the defects.

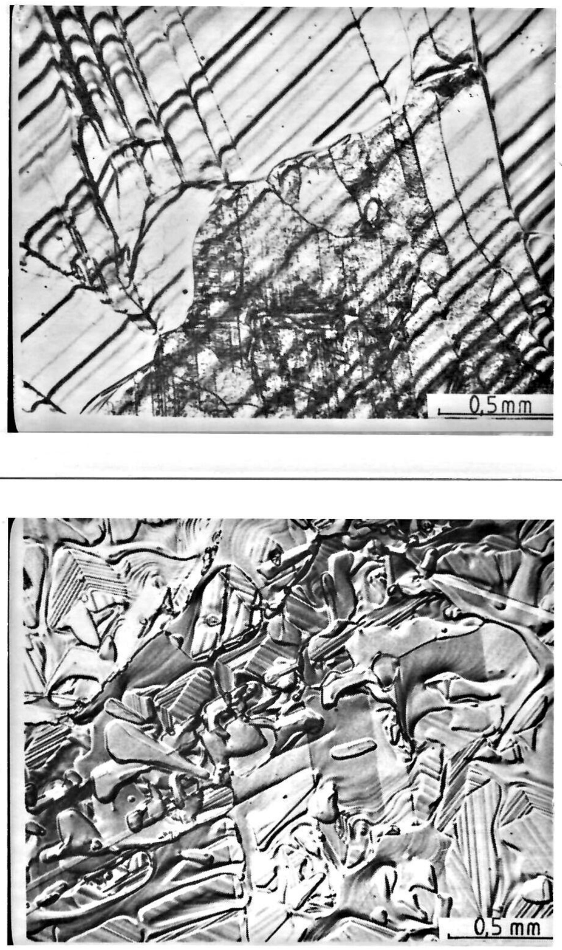
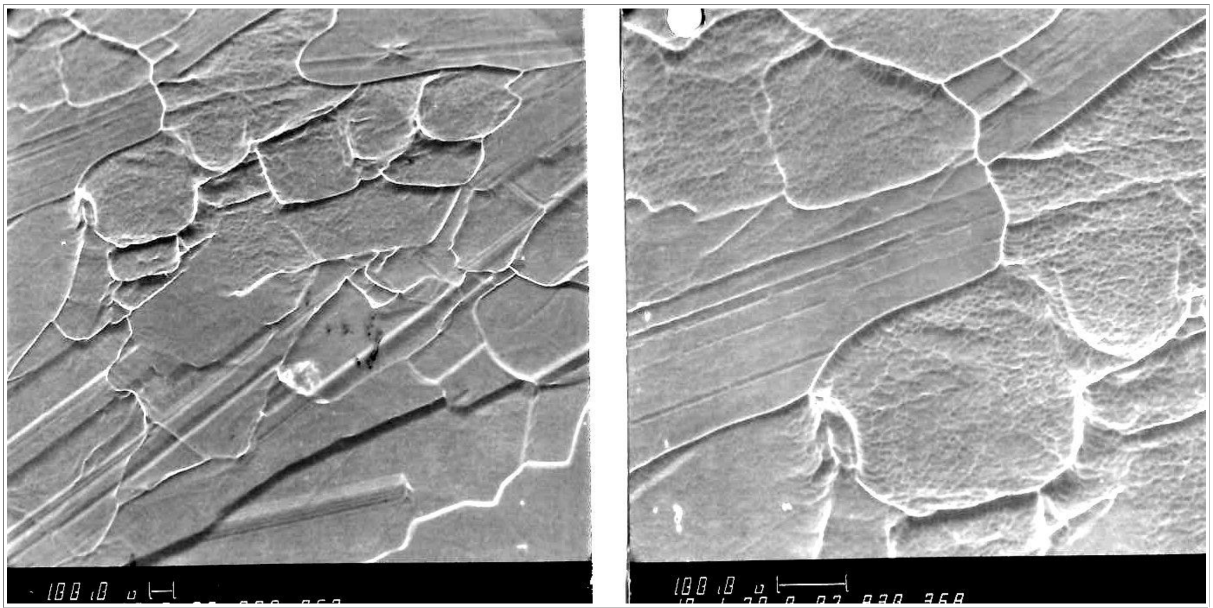
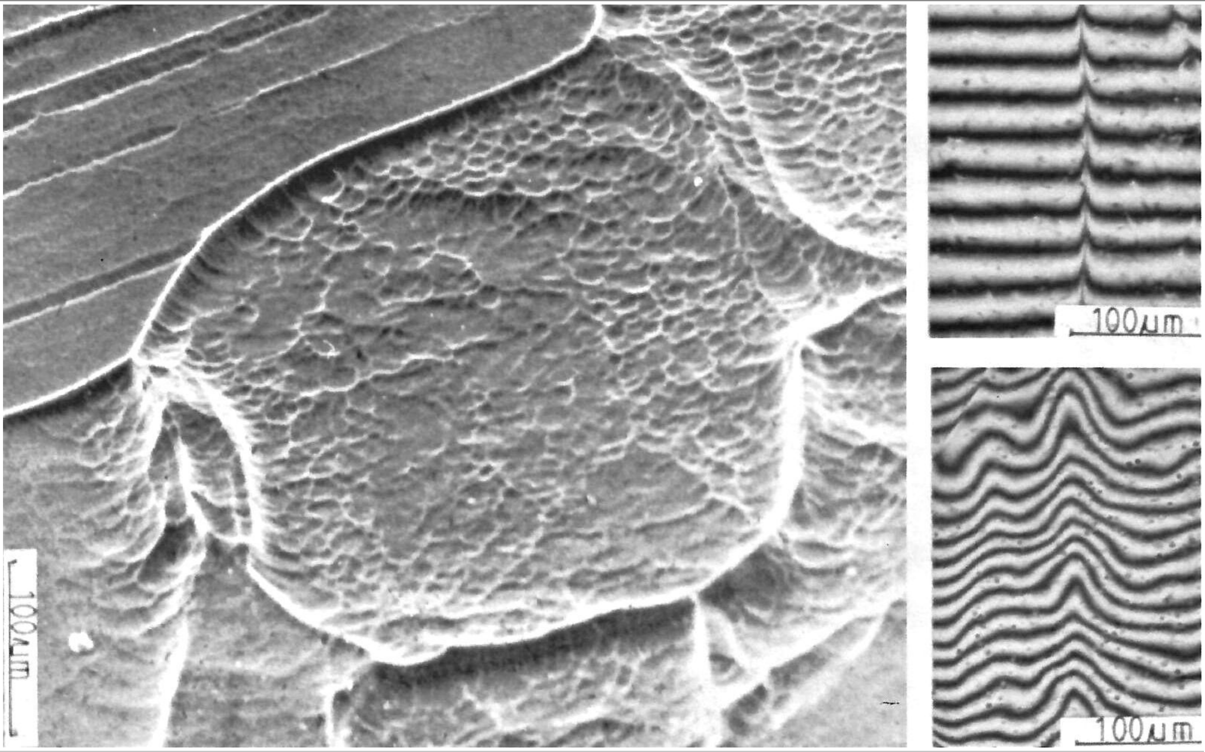


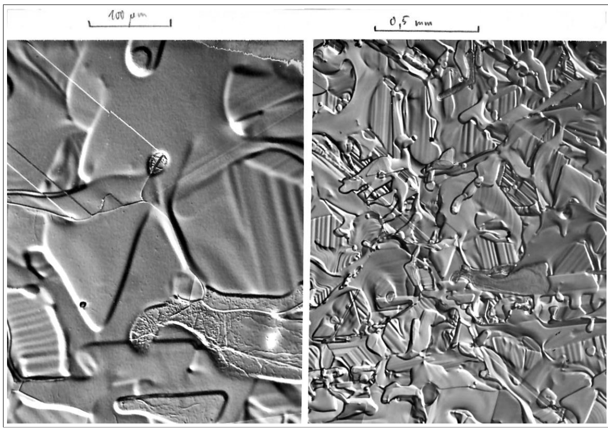
Fig. 5 in publication 55
Etching pattern of n-type poly-Si obtained with illumination. (top) and in the dark (bottom)

Finally some auxiliary pictures to S-Web and characterization:

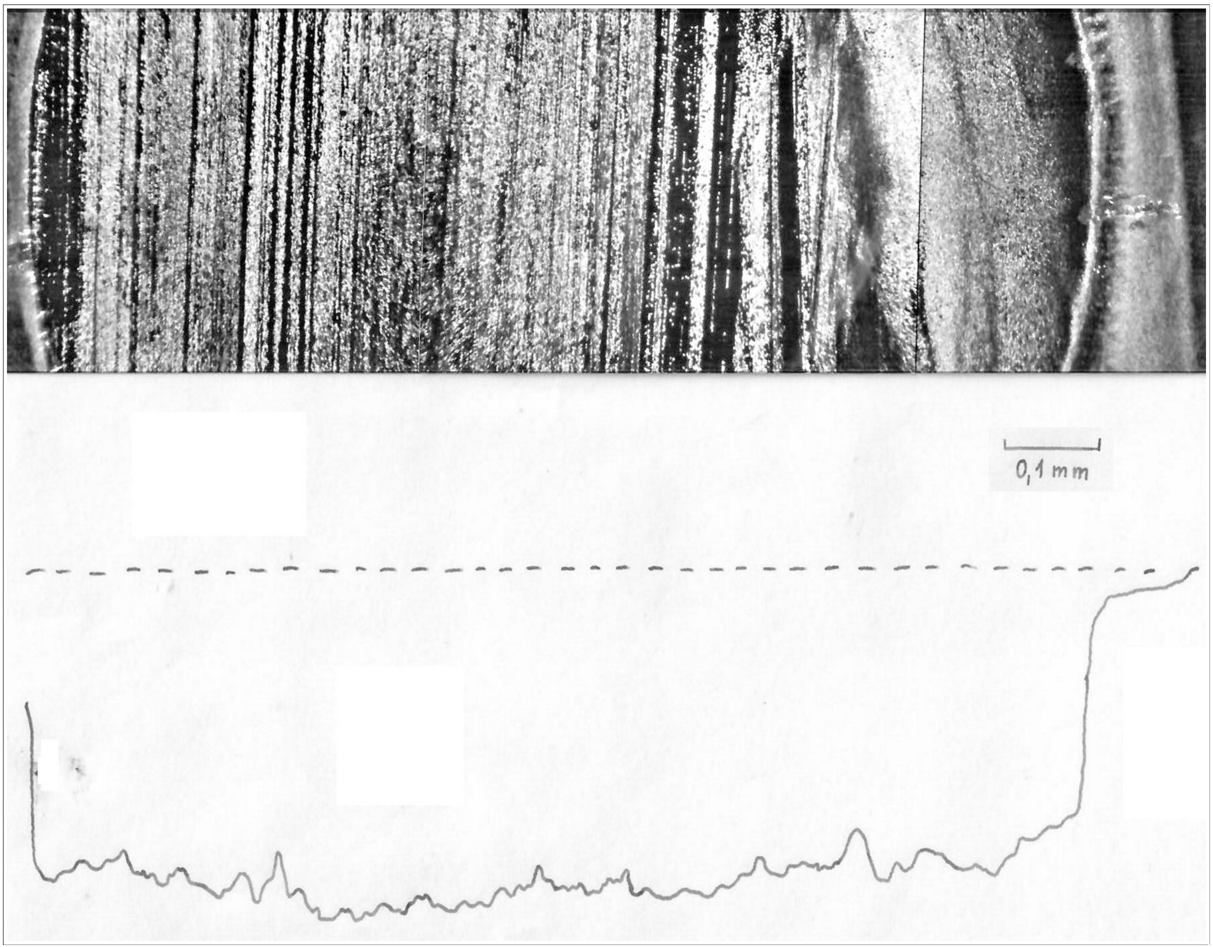




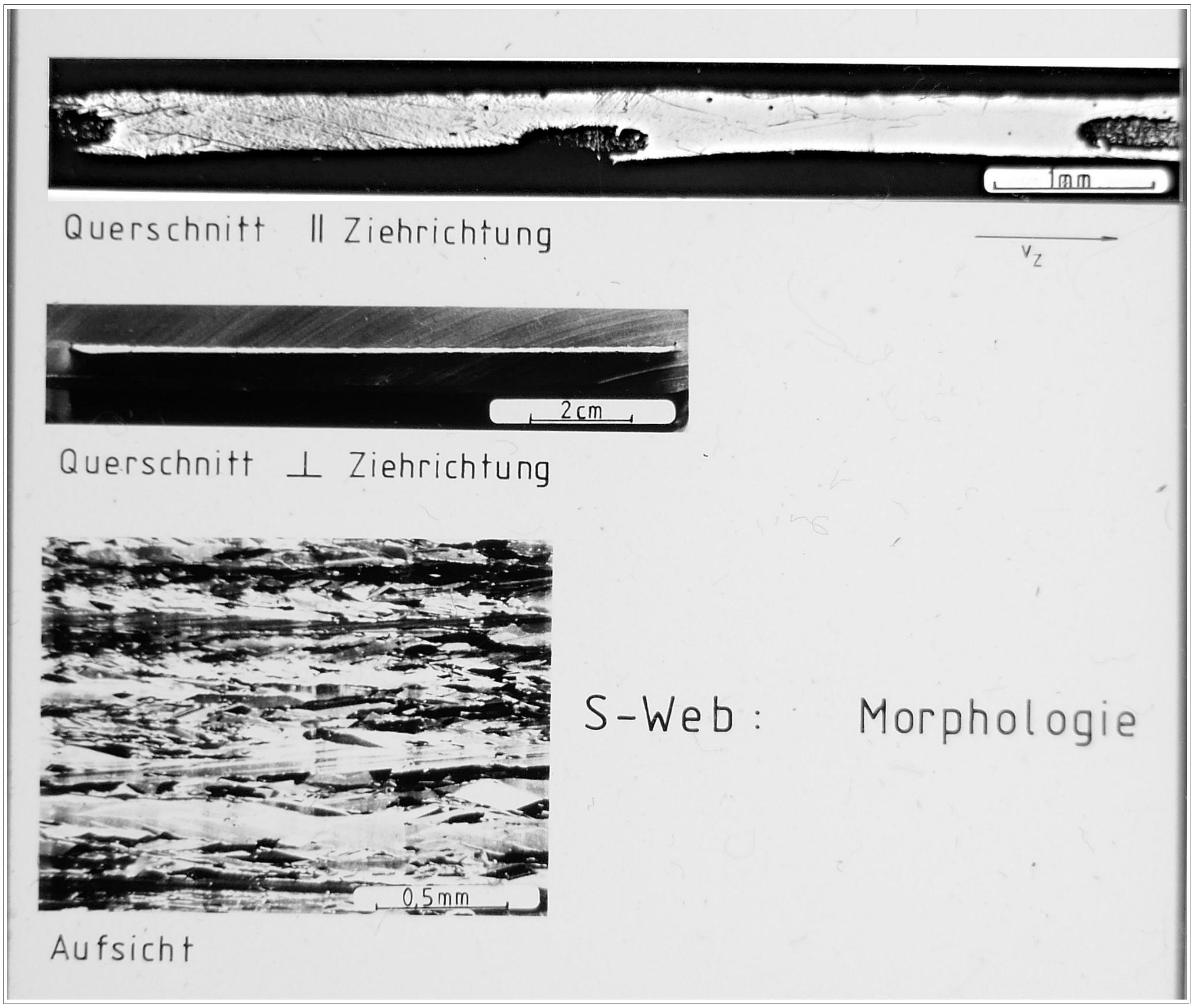
Anodically etching n-type Si under illumination
Some of the photo generated holes recombined at grain doctrinaires and other defects, locally reducing the currant available for etching.
Grain boundaries therefore became visible as “walls” with a thickness directly related to the diffusion length / life time of the minority carriers.
With interference microscopy (lower picture, right) one could measure the diffusion length quite nicely



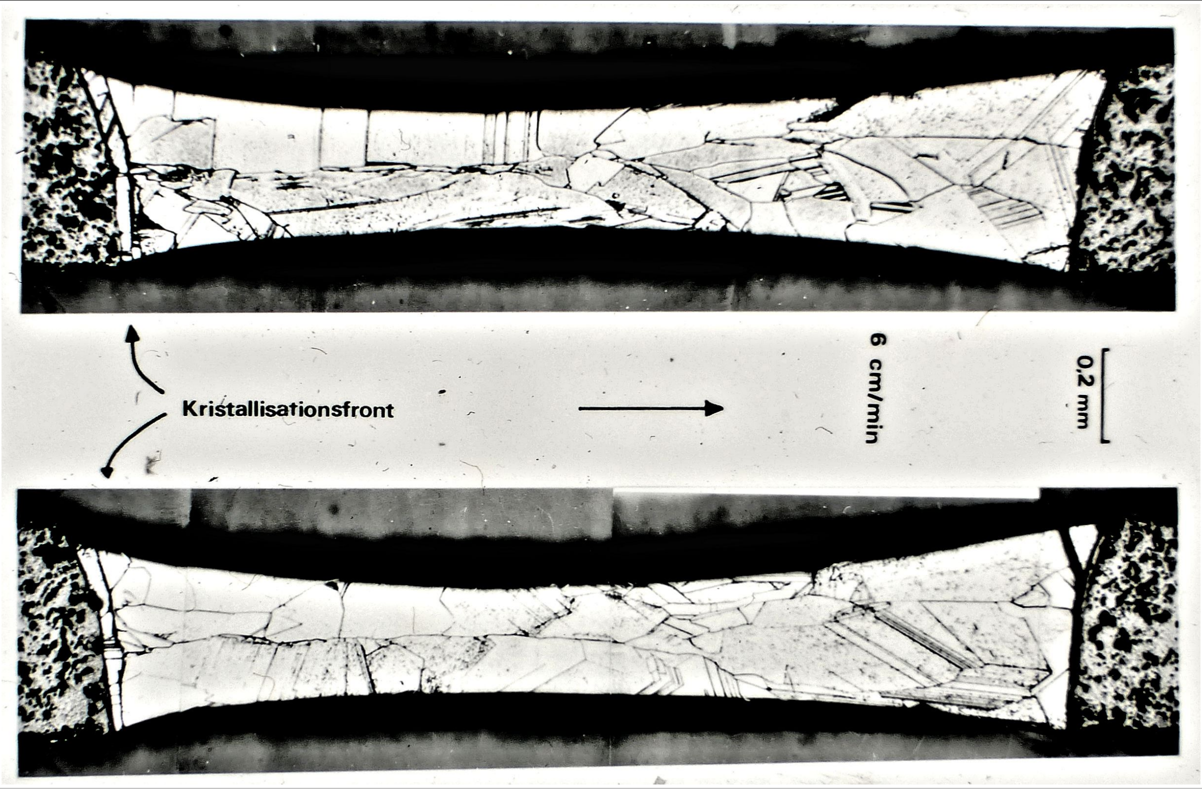
Etching n-type Si in the dark
In this case surface-near defects act as generation centers, generating more carries.
The reverse or leakage current that produced etching thus mirrored the generation life time,
The pictures prove that anodic etching has a large and still mostly untapped potential for defect analysis. .



"Anodic" Laser scan across n-type Si
Just as good as an EBIC scan or a Laser scan across the finished solar cell ("LBIC") but much simpler. While you scanned the leakages current produced a picture of the defects situation in the sample.



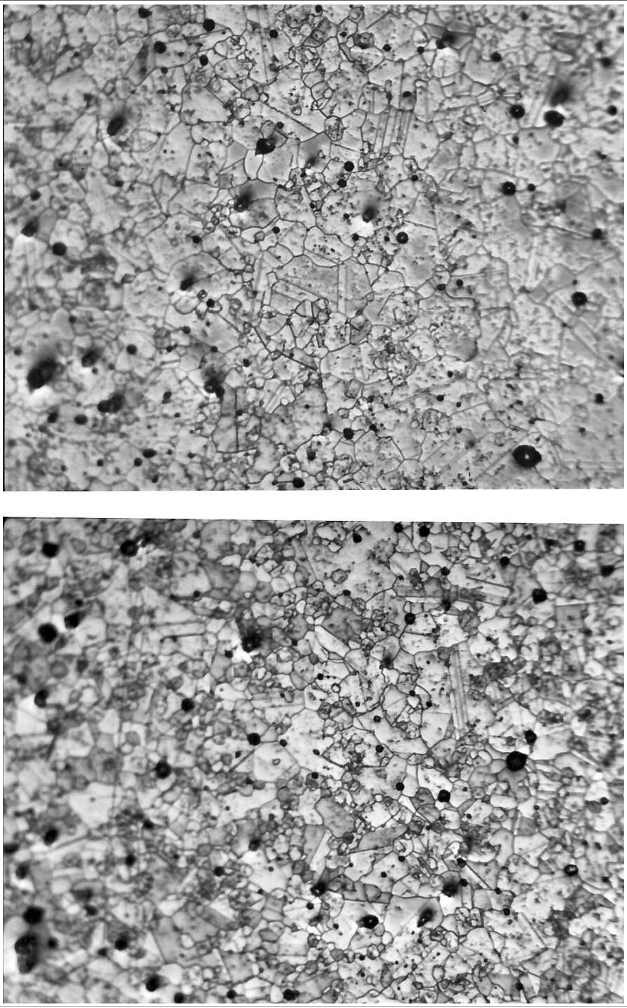
Picture in report 7
Remarkable because it shows .hat we could produce a S-Web as imagined - but not a high pulling speeds



Si crystallizing in a graphite cell Used in report 1
Crystallizing liquid Sui membranes pulled out in the openings of a mesh (here a graphite grid) was of some interest.

Si crystallizing in a graphite cell
As above but top view..

Finally one picture relating to all the other ways projected for making plate Si. Here it is sintering. We never got much from melt spinning project.



Sintered Si plated.

The sintering group did eventually produce some Si sheets or plates. They starred with p-type Si powder but produced n-type sheets with a microstructure clearly not conducive to making solar cells.