3.1 TEM Work at Cornell University

3.1 TEM Investigations of Grain Boundaries in Silicon

3.1.1 Background

- The beginning of 1977 found me in Ithaca, N.Y State, USA. The small town features the a major "ivy league" Cornell University, and its “Materials Science and Engineering” unit was among the best in the USA. I was a post-doc there, charged with **bonding** together two Si wafers in such a way that a **grain boundary** with per-determined geometry resulted. This would allow to look at **grain boundary** structures in a systematic way and, hopefully, would even produce some insights into the electronic properties of grain boundaries in Si. It didn’t.
  - Originally I called the technique “**sintering**” in want of a better word. Later it became known as “**wafer bonding**” ad acquired a lot of interest for advanced micro electronic techniques.
- The project was funded from what today we would call “green energy”, sub group solar cell technology. A newly founded company (Mobile Tyco) was involved too, and on the side I was supposed top look at some special silicon Mobile Tyco produced by a rather involved if not to say crazy technique (Edge-Defined, Film-Fed Growth (***EFG)***.
  - It was my first encounter with solar cell physics and technology, and this topic would stay with me almost all of my active research life.
- The Institute had a Siemens Elmiskop 102 at its disposal that was kept in prime conditions by**Ray Coles**. It actually allowed to take high resolution pictures, and I used this “***HRTEM***” for the grain boundary work and for other projects including later work when I was with IBM. I fondly believe that I took a few "first" HRTEM pictures and I will comment on this in the picture part.

3.1.2 Publications

- Not counting conference proceedings and other small stuff, the total count considering sintered grain boundaries in Si is, once more: one (1)
  Well, may be one could say 1,5 since my colleague and friend **Barry Carter** used my specimen for some complex investigations of diffraction patterns resulting form periodic networks of discolorations in grain boundaries; it's publication No 20 on this list and it collected 44 citations.
  Here is my "list":

19 **FÖLL, H., AST, D.G.: TEM observations on grain boundaries in sintered Si. Phil. Mag. 40 (1979) 589**
(103 citations)
The co-author, Prof, **Dieter Ast**, had written the proposal and thus came up with the money for the project. However, he was away on a sabbatical while I worked on the project and his scientific contribution was minor.

3.1.3 Pictures

- The venerable "Philosophical Magazine" pubnished my work and allowed a lot of space for the pictures. Here are the "originals" plus some auxiliaries:

Sintered Grain Boundary pictures
Part 1
Part 2

Auxiliary