

5.4 Microchip Development

5.4.1 Introduction

After about 2.5 years spend with material aspects of potential solar cell fabrications, I abandoned the (sinking) ship and accepted an internal offer to join the microelectronics crowd. From the middle of 1983 to Sept 91 – a good 8 years – I did what I could to help Siemens make chips that could be sold with a profit. I was not successful – Siemens always lost major money in chip making. Well, I wasn't alone but had a few 100 scientist colleagues supported by thousands of technicians / workers in this enterprise. We were constantly reorganized and my responsibilities changed a lot. However, I was pushed upwards, heading larger and larger groups. I was involved in jobs like analytics, ion implantation, running the R&D line (including clean room security), developing furnace processes of all kinds, developing sputter technologies and God knows what else. In the end I was the project leader for the 16 Mbit DRAM.

- I worked hard but did not publish a lot. If you look at my publications list, the time from 1983 – 1991 is covered by publication 61 – 70. Six of these 9 papers essentially cover old stuff or generalize about chip making. Well, we were not supposed to publish, we were supposed to keep everything of interest as a secret. I thus do not have a lot of high-quality pictures in the first place; and from what I had, little is left. It mostly concerns general issues of chip making.
- My “general papers” concerning chip making, however, were not without interest then and possibly now. Nobody, it seems, had bothered before to provide such an overview. Even today, 33 years later, you will not easily run across reviews of comparable depth and width intended for a general readership and not just experts. That's why I give you these papers and most of their pictures here

5.4.2 Publications

Here is the long and the short version of the "how to make chips" paper:

- 61** FÖLL, H., BECKER, F.S.: Industrielle Entwicklung und Fertigung von Halbleiterbauelementen. (Teil 1 und Teil 2, 80 Seiten, 38 Figuren), in: Festkörperforschung für die Informationstechnik (Hrsgb. und Vertrieb: KFA Jülich, Zentralbibliothek), Ferienkurs 1990, p. 16.1 (invited paper) .
[Part 1](#) [Part 2](#) [Part 3](#)
- 64** [BECKER, F.S., FÖLL, H., SCHLÜTER, K.](#): Die Mega-Generation. mc (Magazin für Computerpraxis) 12 (1990) 60 (invited paper)
This is a Siemens brochure that contains the paper.
- 68,** [BECKER, F.S., FÖLL, H.](#): Gigabit chips zur Jahrtausendwende?. Technische Rundschau 12 (1991) 26 - 32
- 69** FÖLL, H., BECKER, F.S.: Megabit Speicher: Vom Projekt zum Produkt. Technische Rundschau 29 (1991) 44 - 51
This is a Siemens brochure that contains the two papers quoted above plus one paper from F. Becker only.

5.4.2 Pictures

As stated before, there aren't many pictures. And quite a few of what I'm showing appear also in my Hyperscript "[Electronic Materials](#)". This Hyperscript was conceived around 2001 and provided the “text” to a lecture course. The lecture course was replaced by “Advanced Materials” in 2011 but still lives happily in the Net. I'm pleased to note that it regularly draws around 15.000 – 20.000 “clicks” every month.

- Essentially, I provide picture of “dirt” on chips or other items, cross-sections of DRAMs and some impressions from working in a clean room.

[Microelectronic - Pictures](#)