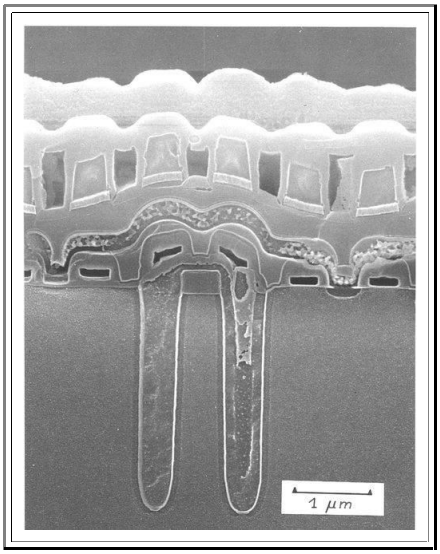
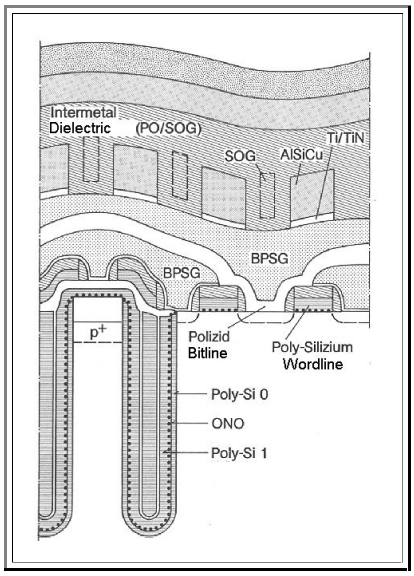
Cross Section of 16 Mbit DRAM and 64 Mbit DRAM

Illustration

Below a large **SEM** micrograph showing the cross-section of an (early) **16 Mbit DRAM**.

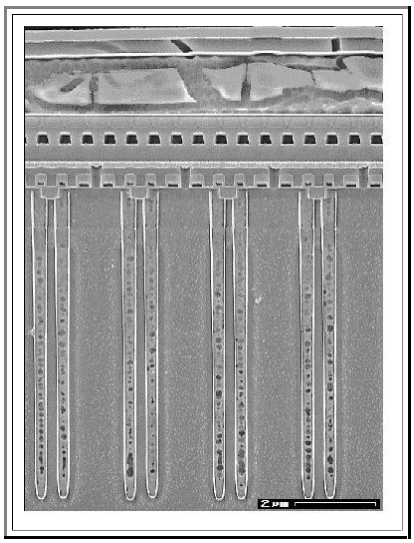




Some explanations:

- The two deep "trenches" (they are really holes) contain the capacitors. There dielectric (with ca. **7 nm** far too thin to be visible) is "**ONO**", a triple layer of Oxide - Nitride - Oxide.
- The trench os lined with poly-**Si** as a first electrode and as the second electrode.
- To the left and right two transistor gates are visible. The sources of both transistors is the (poly-**Si**) electrode lining the trench and the diffused areas being contacted by the "Polizid bitline". "Polizid" means a double layer of poly-**Si** and **$MoSi_2$** Molybdenum-silicide.
- The "poly-**Si** wordline" runs perpendicular to the picture and connects the gates of the transistors
- The "**BPSG**" layers denote **SiO_2** doped with **B** and **P** that serves as insulating dielectric. It is essentially a glass.
- Parallel to the word lines are **Ti/TiN/AlSiCu** lines. They contact the wordlines every once in a while to decrease the ohmic resistance. The consist of a layer sequence: **Ti**, **TiN**, and **Al** doped with about **0,5%** of **Si** and **Cu**.
- On top of this first metal layer is another one running across the picture.
- The metals are insulated by the intermetal dielectric composed of plasma-oxide (**PO**) that contains spin-on-glass (**SOG**) in the interstices.

Below the successor of the **16 Mbit DRAM**, the **64 Mbit DRAM** from a development stage around about **1996**.



The structure is essentially the same, but all layers have been planarized.