# HRTEM of Gateoxide and ONO

Illustration

Here are two ***HRTEM*** pictures of "gate" dielectrics form around **1990** from the Siemens Laboratories in Munich. It is actually not the gate dielectric in these pictures, but the dielectric in the capacitor of a ***DRAM*** memory cell. The properties of this oxide are just as critical as under the gate of a transistor.

- The one on the left show the "conventional" single layer of **$SiO_2$** that was grown by thermal oxidation.
- The picture on the right shows "***ONO***". Here the first oxide is grown by thermal oxidation of the substrate wafer, the nitride is deposited by **CVD**, and the top oxide layer is produced by oxidizing the nitride.