

Semiconductor Glossary

*A Resource for
Semiconductor
Community*

Second Edition

Jerzy Ruzyllo

 World Scientific

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gate stack, poly-Si gate, silicide, Field Effect Transistor

gate dielectric a very thin layer of an insulator sandwiched between semiconductor and the gate contact in MOS devices; in silicon MOSFETs it is typically a thermally grown SiO_2 , often nitrided; depending on application it can be as thin as 1.0 -1.2 nm (advanced digital integrated circuits) or as thick as 50 nm (discrete power MOSFETs); in ultra-small geometry (below 45 nm) CMOS ICs the SiO_2 is replaced with gate dielectrics featuring higher than SiO_2 dielectric constant k such as e.g. hafnium dioxide HfO_2 ; dielectrics such as Si_3N_4 and Al_2O_3 are used as gate dielectrics in non-silicon MOSFETs as well silicon and non-silicon TFTs.

high- k dielectric, silicon dioxide, MOSFET, nitrided oxide, thermal oxidation, Thin-Film Transistor

gate injection during the constant-current stress of the MOS gate stacks (oxide reliability test) electrons are injected into the oxide from the gate contact (negative bias on the gate contact).

constant-current stress, substrate injection

gate leakage a leakage current flowing across the MOS gate structure in the MOSFET; contributor to the possible overheating of the logic ICs.

gate dielectric, leakage current, MOSFET

gate length effective length of the gate contact at the surface of the Si substrate in the MOSFET in the direction of current flow; physical gate length is typically smaller than channel length; an approximate representation of the various technology nodes (technology generations).

gate scaling, technology generation

gate oxidation process of thermal oxidation of silicon which forms an oxide for the MOS gate stack; typically carried out in dry oxygen at the temperature in the range 700°C - 1000°C depending on the desired thickness of the gate oxide.

gate oxide, thermal oxidation, gate stack

gate oxide see *gate dielectric*.