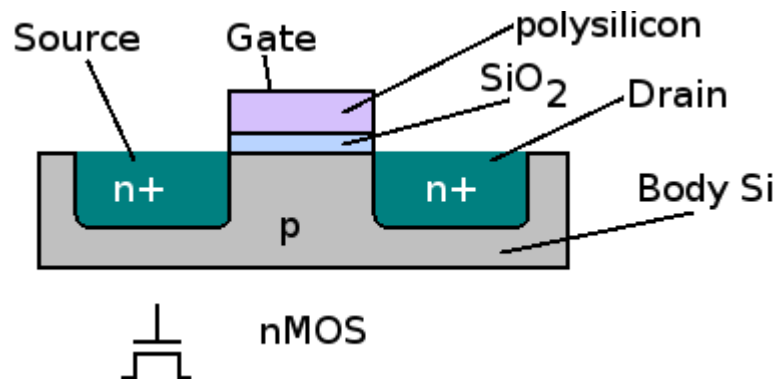


NMOS, PMOS and CMOS transistors:



NMOS:-

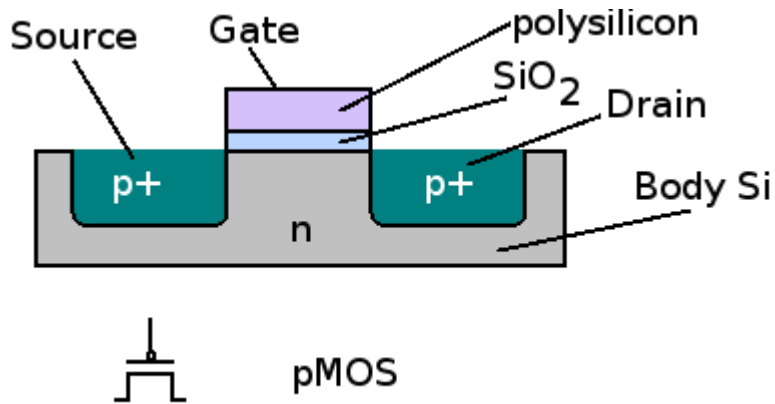
- °Four terminals: gate, source, drain, body
- °Gate – oxide – body stack looks like a capacitor
- Gate and body are conductors
- SiO₂ (oxide) is a very good insulator
- Called metal – oxide – semiconductor (MOS) capacitor
- °Body is usually tied to ground (0 V)

- °When the gate is at a low voltage:
 - P-type body is at low voltage
 - Source-body and drain-body diodes are OFF
 - No current flows, transistor is OFF

- °When the gate is at a high voltage:
 - Positive charge on gate of MOS capacitor
 - Negative charge attracted to body
 - Inverts a channel under gate to n-type
 - Now current can flow through n-type silicon from source through channel to drain, transistor is ON

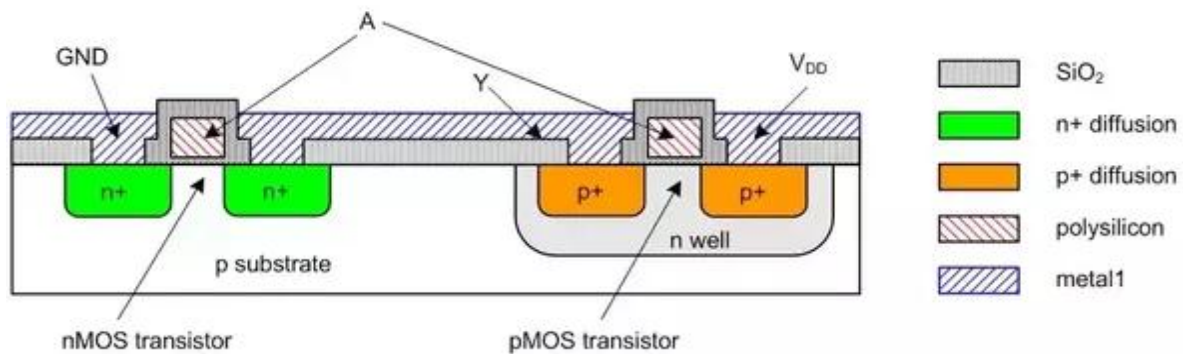
PMOS:-

- **Similar, but doping and voltages reversed**
- **Body tied to high voltage (VDD)**
- **Gate low: transistor ON**
- **Gate high: transistor OFF**
- **Bubble indicates inverted behavior**



CMOS:-

- Typically use p-type substrate for nMOS transistors
- Requires n-well for body of pMOS transistors



Advantages of CMOS Technology

These devices are used in a range of applications with analog circuits like, image sensors, data converters, etc. The advantages of CMOS technology over NMOS are as follows.

- Very low static power consumption
- Reduce the complexity of the circuit
- High density of logic functions on a chip
- Low static power consumption
- High noise immunity