Body Effect: As , more holes are attracted to the substrate connection, leaving a larger negative charge behind. Therefore, the depletion region becomes wider, and & also increase.

Channel-Length Modulation Effect: The actual length of the inverted channel gradually decreases as the potential difference between the gate and the drain increases, which will result in non-ideal current source.

Subthreshold Conduction: For slightly smaller than , a weak inversion layer still exists and some current flows from drain to source. Even for < , the drain current is finite, but it shows an exponential dependence on .

Punch Through: In short channel devices, an excessively large widens the depletion region around the drain so much that it touches around the source, creating a very large drain current.

Chemical Vapor Deposition: A process of depositing films by reacting chemical vapors to produce a film on a substrate.

DIBL (Drain Induced Barrier Lowering): In short channel devices, the drain voltage also makes the surface more positive by creating a 2D field in the depletion region. The barrier to the flow charge and hence the threshold voltage are decreased.

Mobility Degradation: High vertical electric field filed between the gate and the channel confines the charge carriers to a narrow region below the oxide-silicon interface, leading to more scattering and lower the mobility.

Velocity Saturation: v = μE, and μ also depends on the lateral electric field in the channel, beginning to drop as the field reaches 1V/μm. Therefore, carriers will reach a saturated velocity at some point along the channel.

Hot Carrier Effect: The instantaneous velocity and hence the kinetic energy of carriers continue to increase as they accelerate towards the drain. Hot carriers may hit the silicon atoms at high speeds, thereby creating impact ionization.

Impact Ionization: The process in the material by which one energetic charge carrier can lose energy by the creation of other charge carriers. It introduces a small signal resistance from the drain to the substrate rather than to the source.

Avalanche Breakdown: The process occurs when the carriers in the transition region are accelerated by the electric field to energies sufficient to free electron-hole pairs via collisions with bound electrons.

Moore’s Law: The number of transistors per chip will double every 12 or 18 months.