



VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

School of Electronics Engineering SENSE

Techno-Quorum Series

SPEAKER : I BENJAMIN

DATE : 04-09-2019

TIME : 11.40AM – 12.30PM

VENUE : AB1 - 508

Lecture Topic: High Electron Mobility Transistors for Microwave Applications

Novelty

- High Power
- High Speed
- High Communication Efficiency

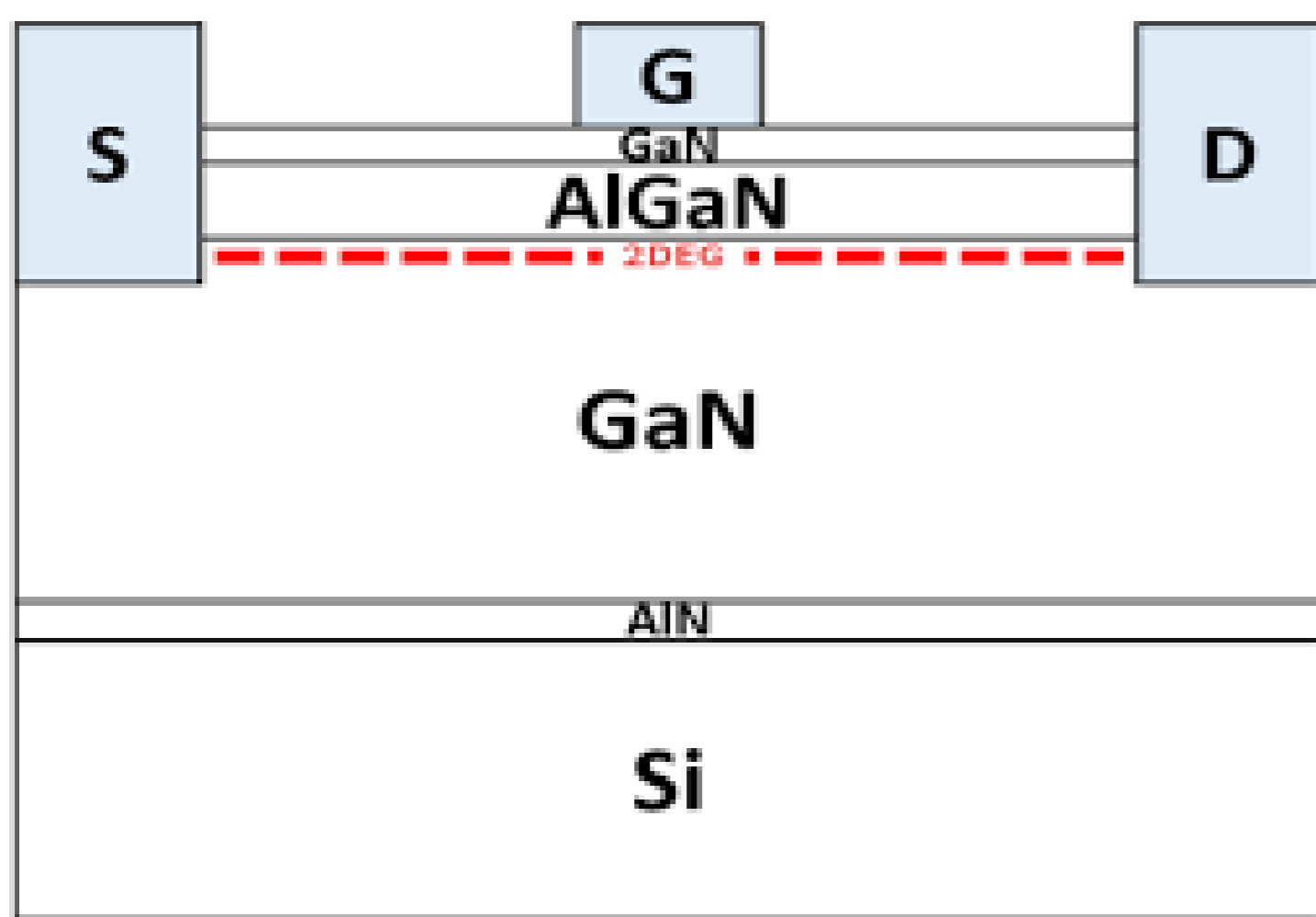
Types

- AlGaAs/GaAs
- AlGaN/GaN

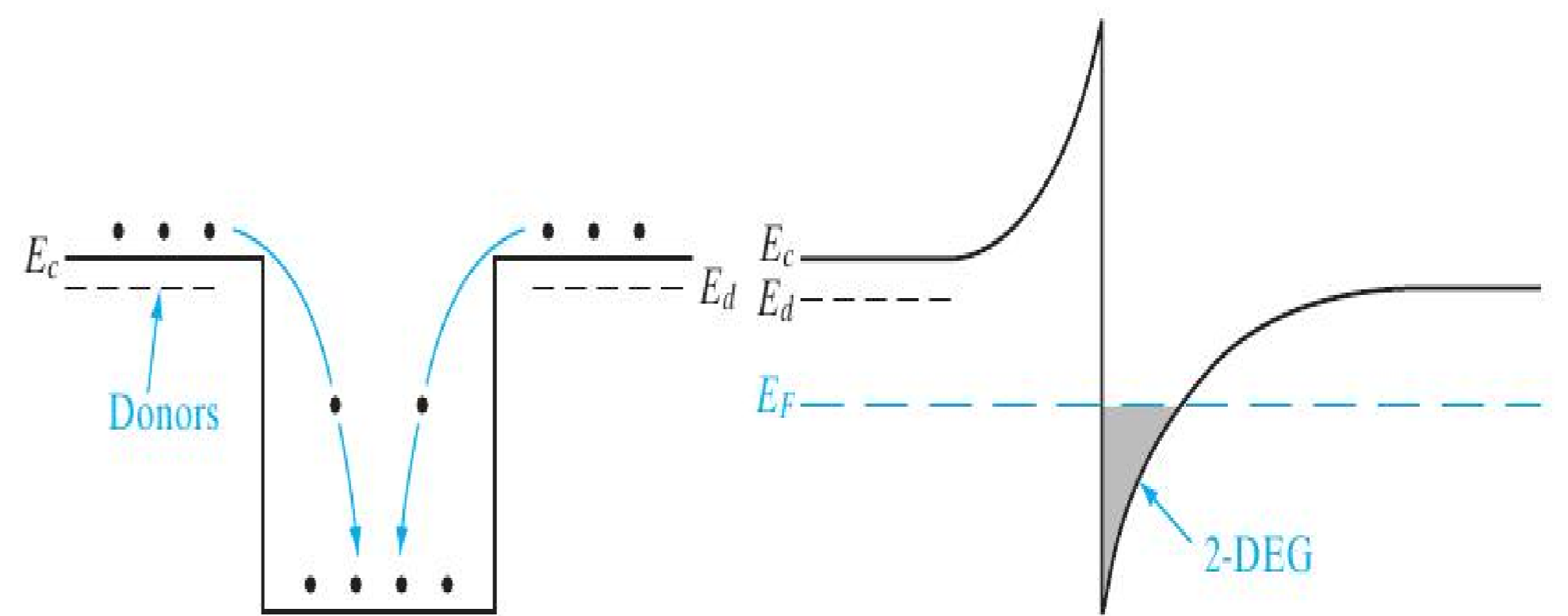
Operational Principal

- Polarization Effect
- Formation of Quantum Well
- 2-Dimensional Electron Gas (2DEG)

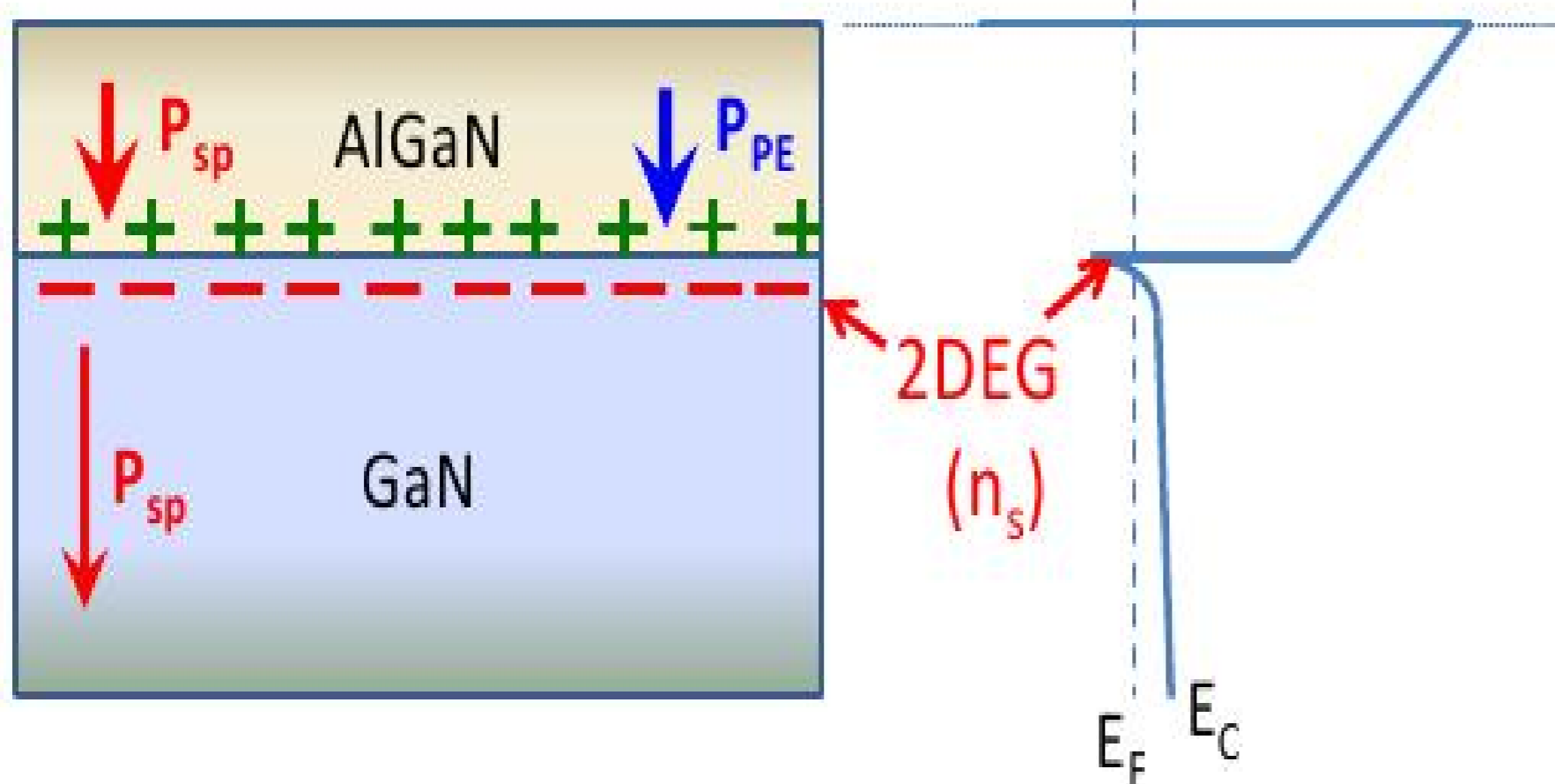
Structure of AlGaN/GaN - HEMT



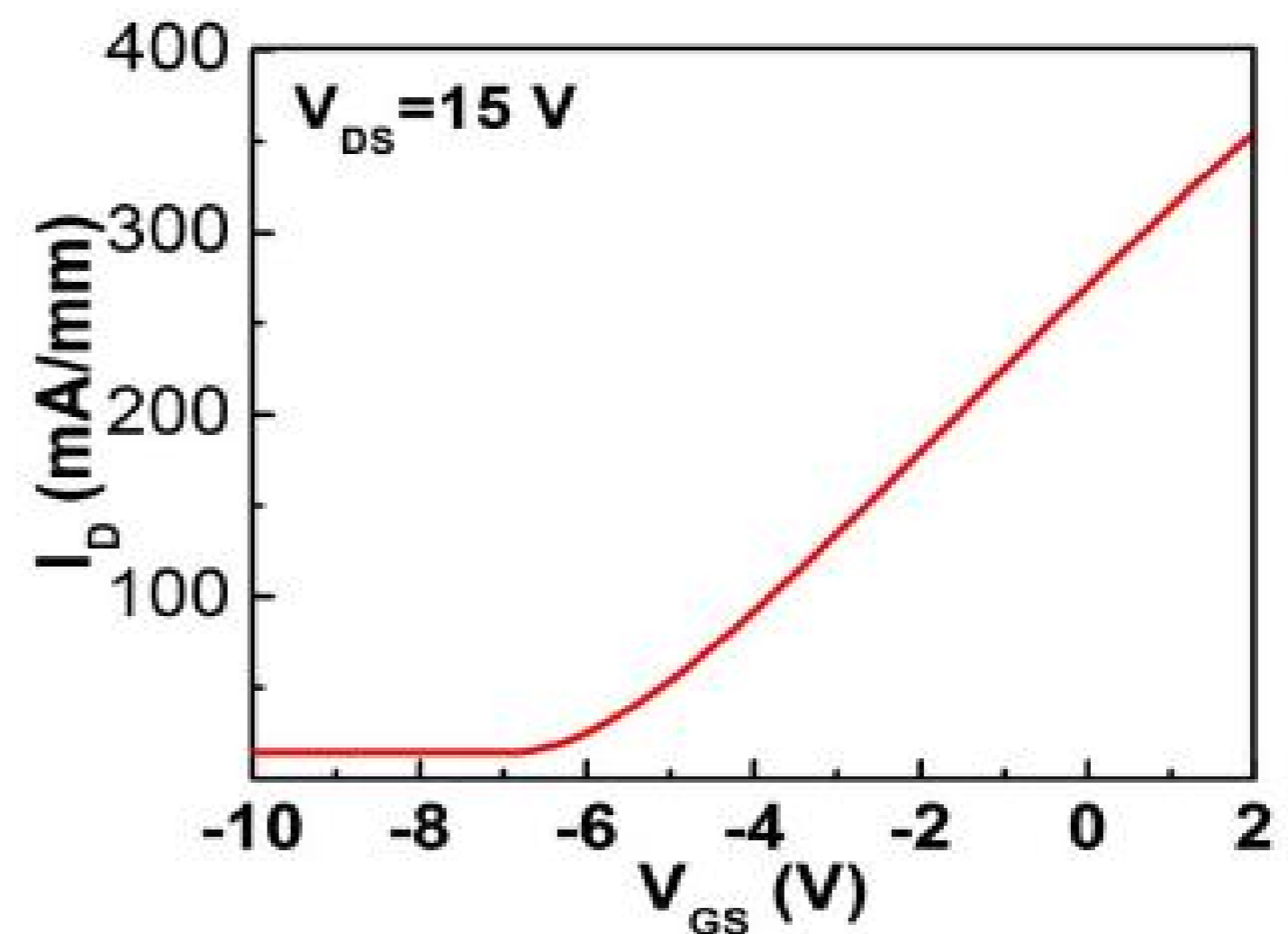
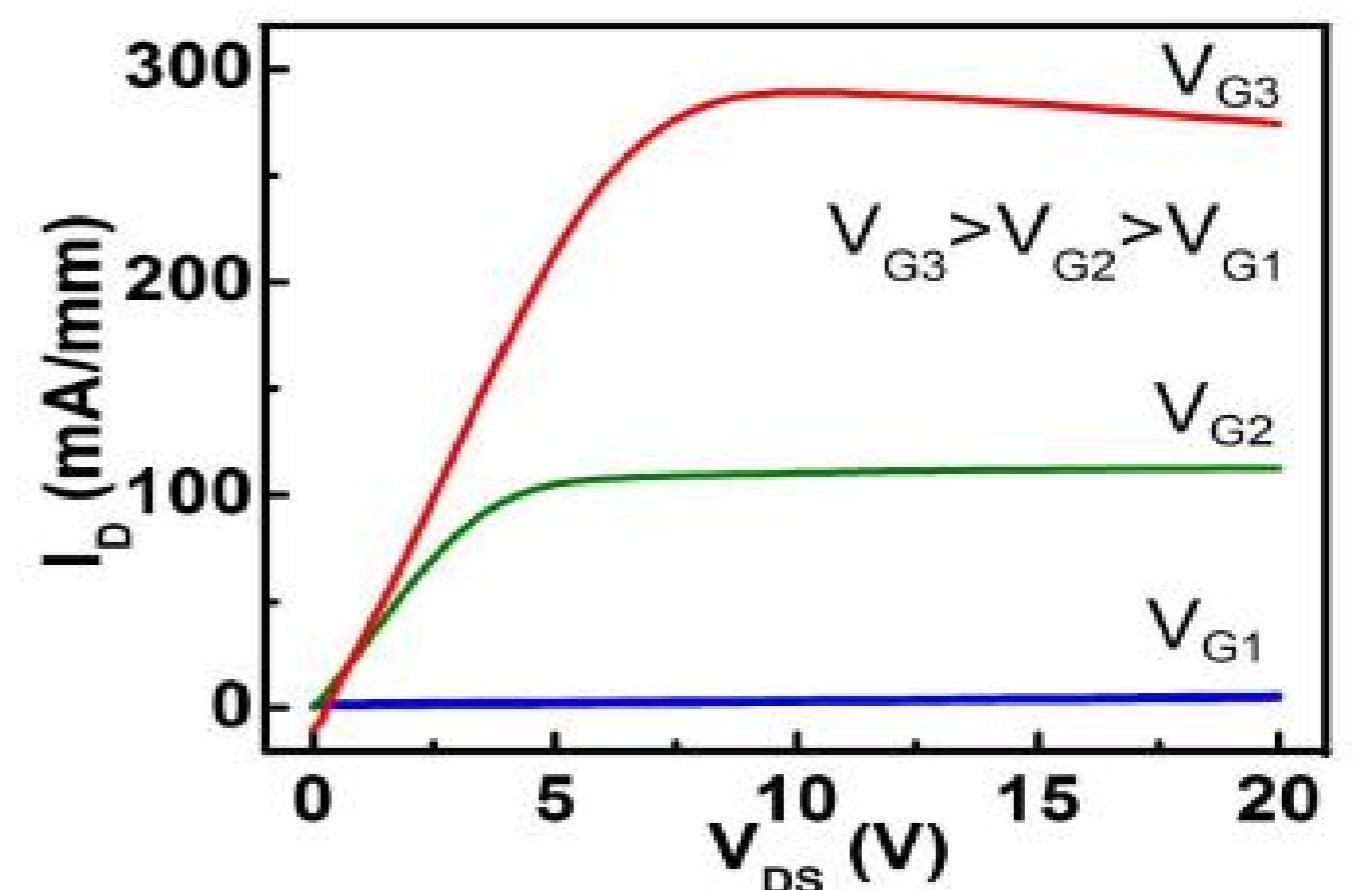
Operational Principal



Polarization Effect in AlGaN/GaN HEMT



$I_d - V_{ds}$ - $I_d - V_{gs}$ Characteristics



Advantage of GaN

- High Breakdown Field: 3MV/cm
- High V_{sat} at 2.5×10^7 cm/s
- High Thermal Conductivity: 3 * GaAs
- Large Channel Charge: $> 1 \times 10^{13}$ cm⁻²
- Good Electron Mobility: 1200 cm²/V-s

Advantage of AlGaN/GaN HEMT

- High Peak Electron Velocity – High Speed/Frequency Operation
- Output Power Density $P_{out} > 10$ W/mm
- Current Gain Cutoff Frequency, $f_t > 100$ GHz

Problems in AlGaN/GaN HEMT

- High Gate Leakage
- Increased Off-Power dissipation
- Low Current Drive
- Limited Positive Gate Voltage Swing

Student Coordinators

R MANIKANDAN
S KALYANI
Research Scholars/ SENSE

Supervisor

Dr. BINDU B
Associate Professor/ SENSE

Research Coordinator

Dr. ANNIS FATHIMA A
Associate Professors/ SENSE

DEAN

Dr. SIVASUBRAMANIAN A
Professors/ SENSE