

Lecture 6: Integrated Circuit Resistors

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Lecture Outline

- Semiconductors
- Si Diamond Structure
- Bond Model
- Intrinsic Carrier Concentration
- Doping by Ion Implantation
- Drift
- Velocity Saturation
- IC Process Flow
- Resistor Layout
- Diffusion

Resistivity for a Few Materials

- Pure copper, 273K 1.56×10^{-6} ohm-cm
- Pure copper, 373 K 2.24×10^{-6} ohm-cm
- Pure germanium, 273 K 200 ohm-cm
- Pure germanium, 500 K .12 ohm-cm
- Pure water, 291 K 2.5×10^7 ohm-cm
- Seawater 25 ohm-cm

What gives rise to this enormous range?

Why are some materials semi-conductive?

Why the strong temp dependence?