

Lecture 5

PN Junction and MOS Electrostatics(II)

PN JUNCTION IN THERMAL EQUILIBRIUM

Outline

1. Introduction
2. Electrostatics of pn junction in thermal equilibrium
3. The depletion approximation
4. Contact potentials

Reading Assignment:

Howe and Sodini, Chapter 3, Sections 3.3-3.6

1. Introduction

- pn junction
 - p-region and n-region in intimate contact

Why is the p-n junction worth studying?

It is present in virtually every semiconductor device!

Example: CMOS cross-section

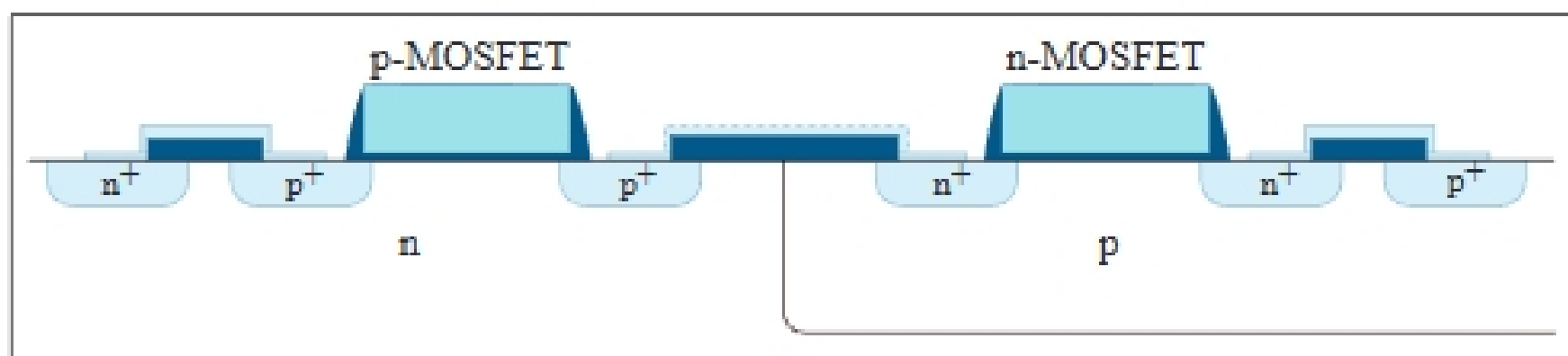
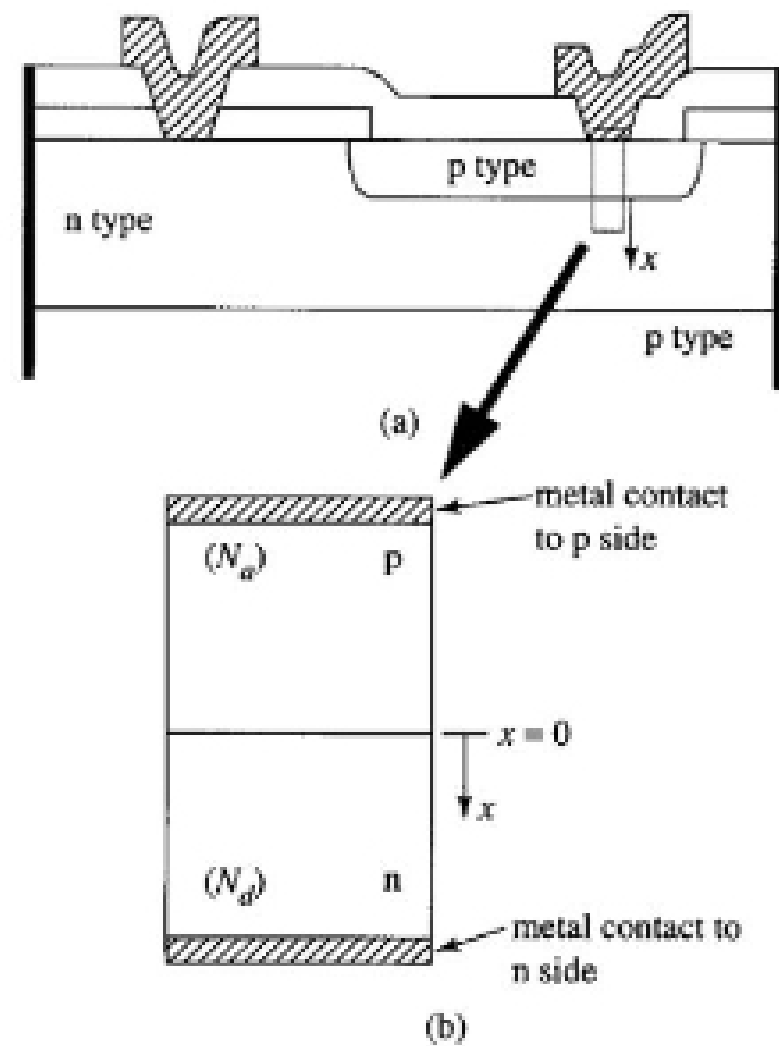


Figure by MIT OpenCourseWare.

Understanding the pn junction is essential to understanding transistor operation

2. Electrostatics of p-n junction in equilibrium

Focus on intrinsic region:



Doping distribution of an **abrupt** p-n junction

