Working Principle of a Semiconductor Based Solar Cell

How to Transform Light into Electricity

Week 2.1

Arno Smets

Semiconductor

Solar Cell

Outline Week 2

Working principle of semiconductor based solar cells:

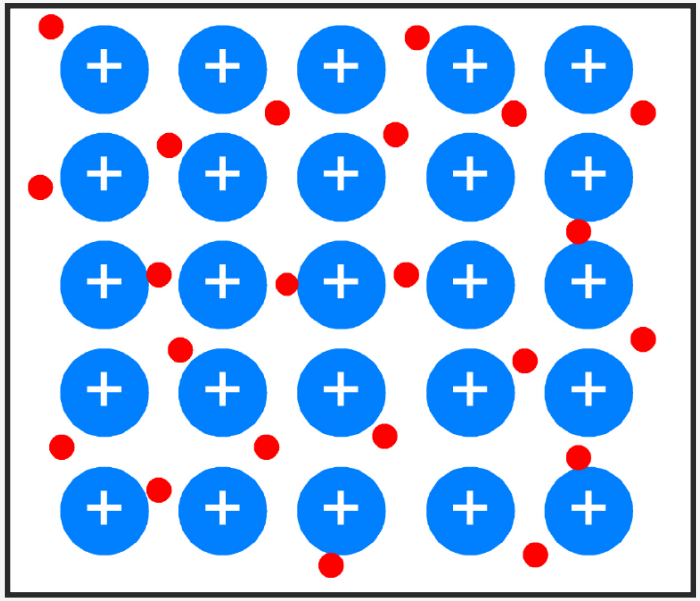
2.1 Semiconductor Materials

2.2 Charge carrier excitation

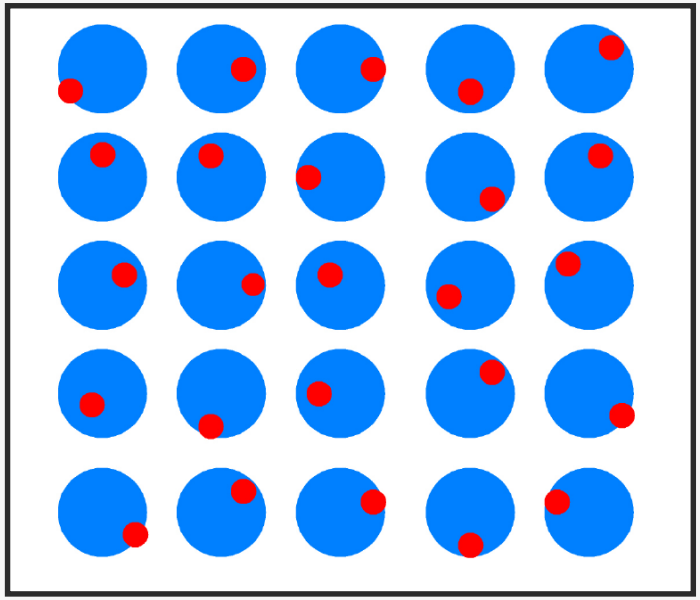
2.3 Charge carrier transport mechanisms

2.4 Semiconductor Junction

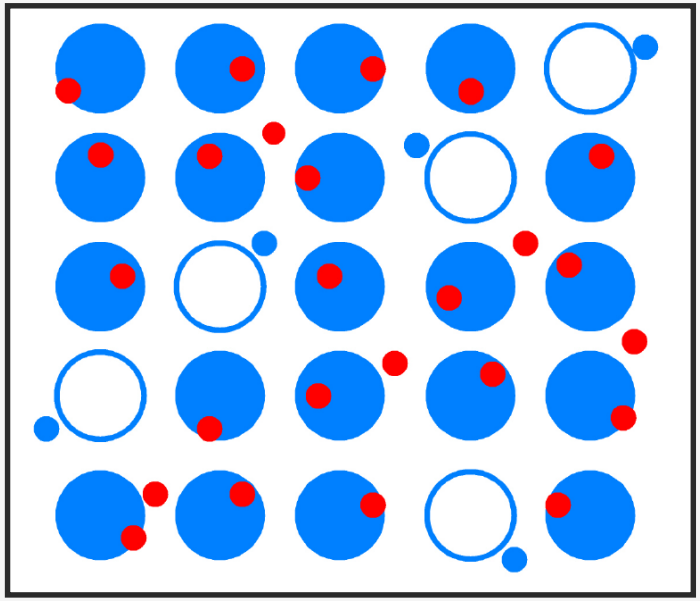
Metal



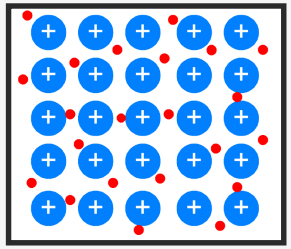
Insulator



Semiconductor



Metal



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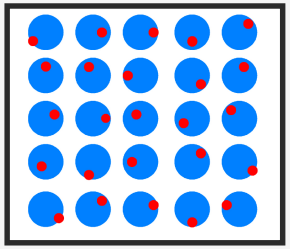
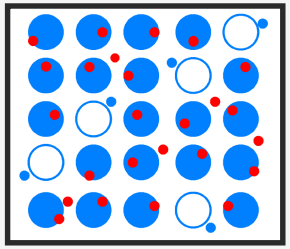
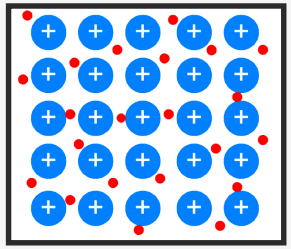
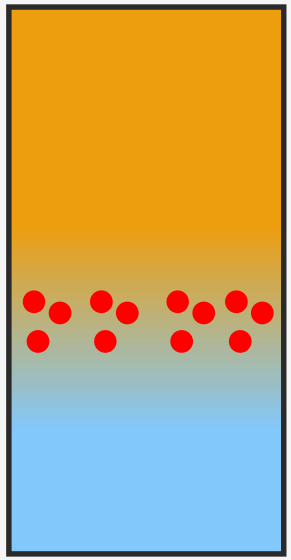


Semiconductor

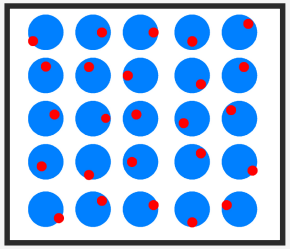


Metal

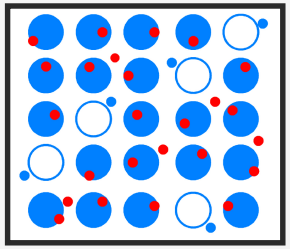


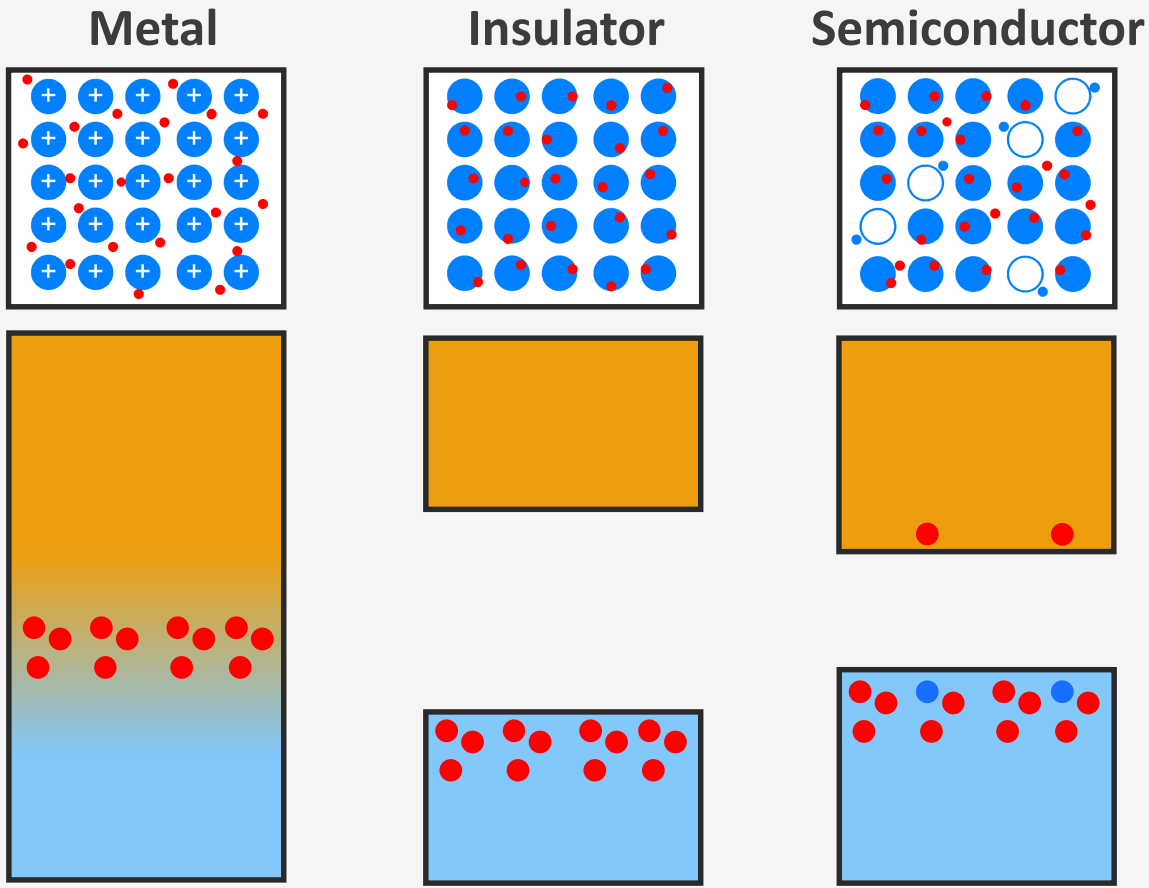


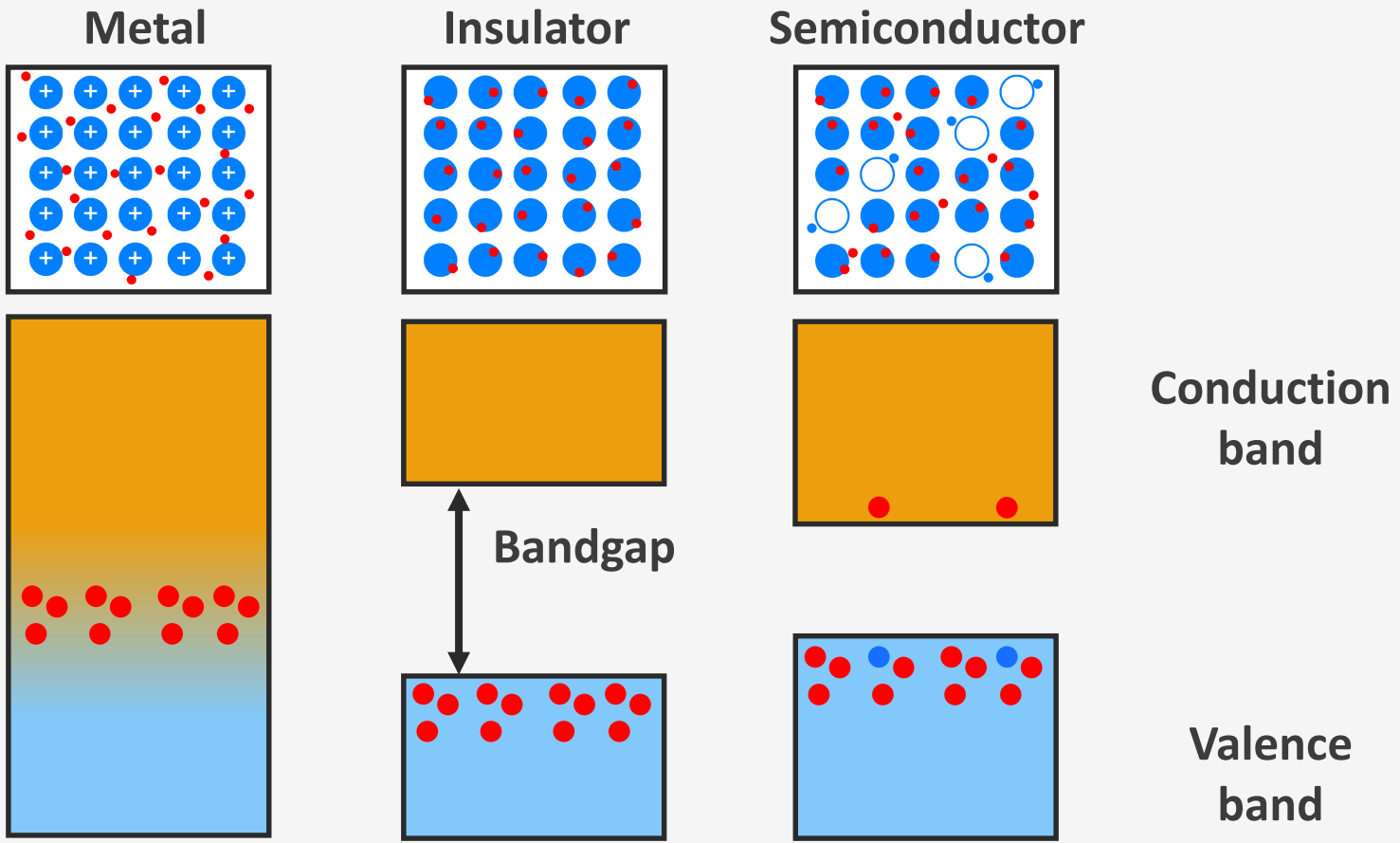
Insulator

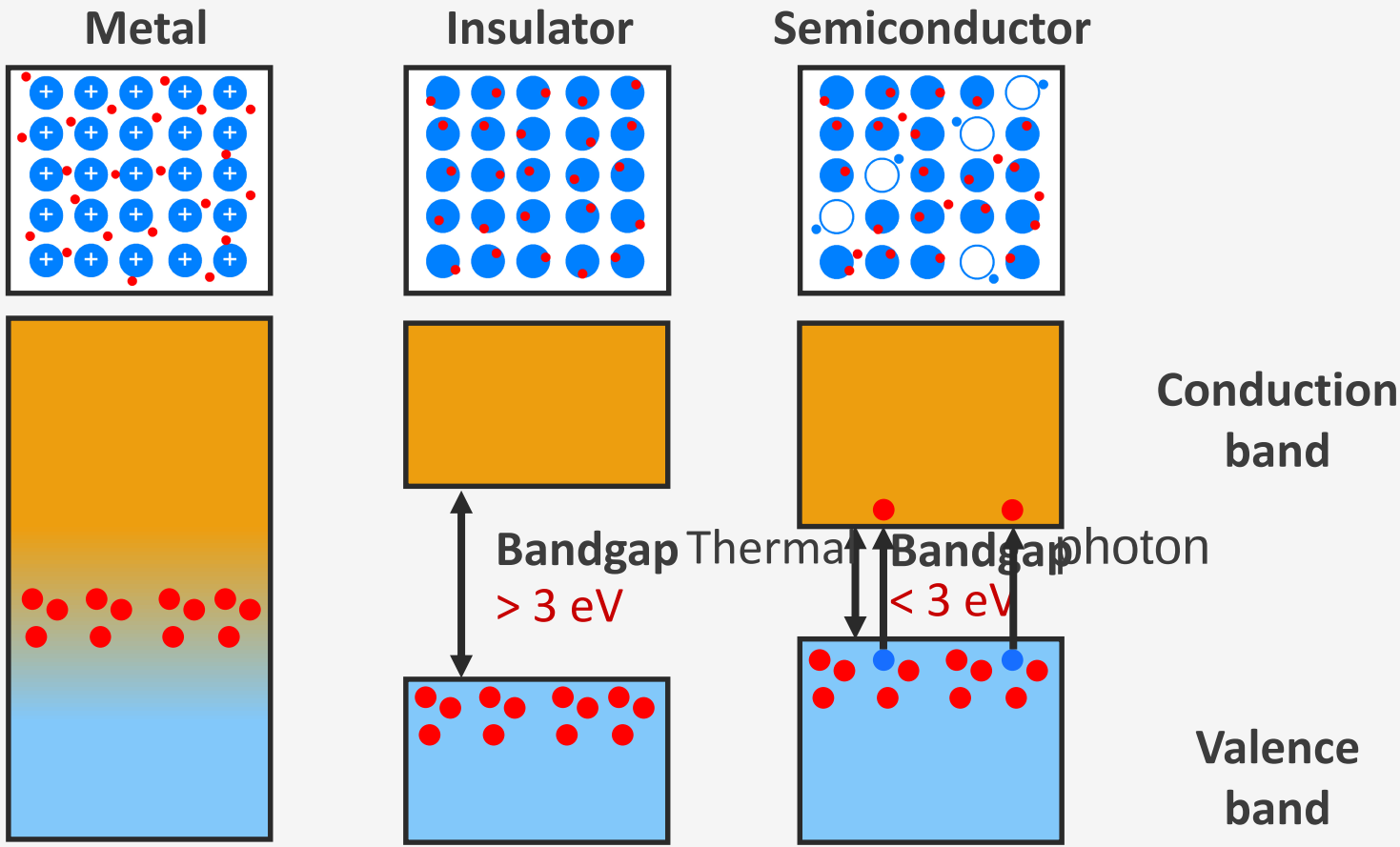


Semiconductor




Metal
Insulator
Semiconductor


Metal
Insulator
Semiconductor
Conduction band
Bandgap
Valence band


Metal
Insulator
Semiconductor
Conduction band
Bandgap
> 3 eV
Thermal photon
Bandgap
< 3 eV
Valence band

Outline Week 2

Working principle of semiconductor based solar cells:

2.1 Semiconductor Materials (Band Gap I – *electrons in atoms*)

2.2 Charge carrier excitation

2.3 Charge carrier transport mechanisms

2.4 Semiconductor Junction