Dispositivos Fotovoltaicos: Materiais e Tecnologia

Dispositivos Fotovoltaicos: Materiais e Tecnologia

Avaliação

Avaliação contínua

Teste (8 valores minimo)	60%
Relatório dos trabalhos de laboratório	20%
Relatório PVFactory	20%

A aprovação à disciplina faz-se por avaliação contínua ou exame final

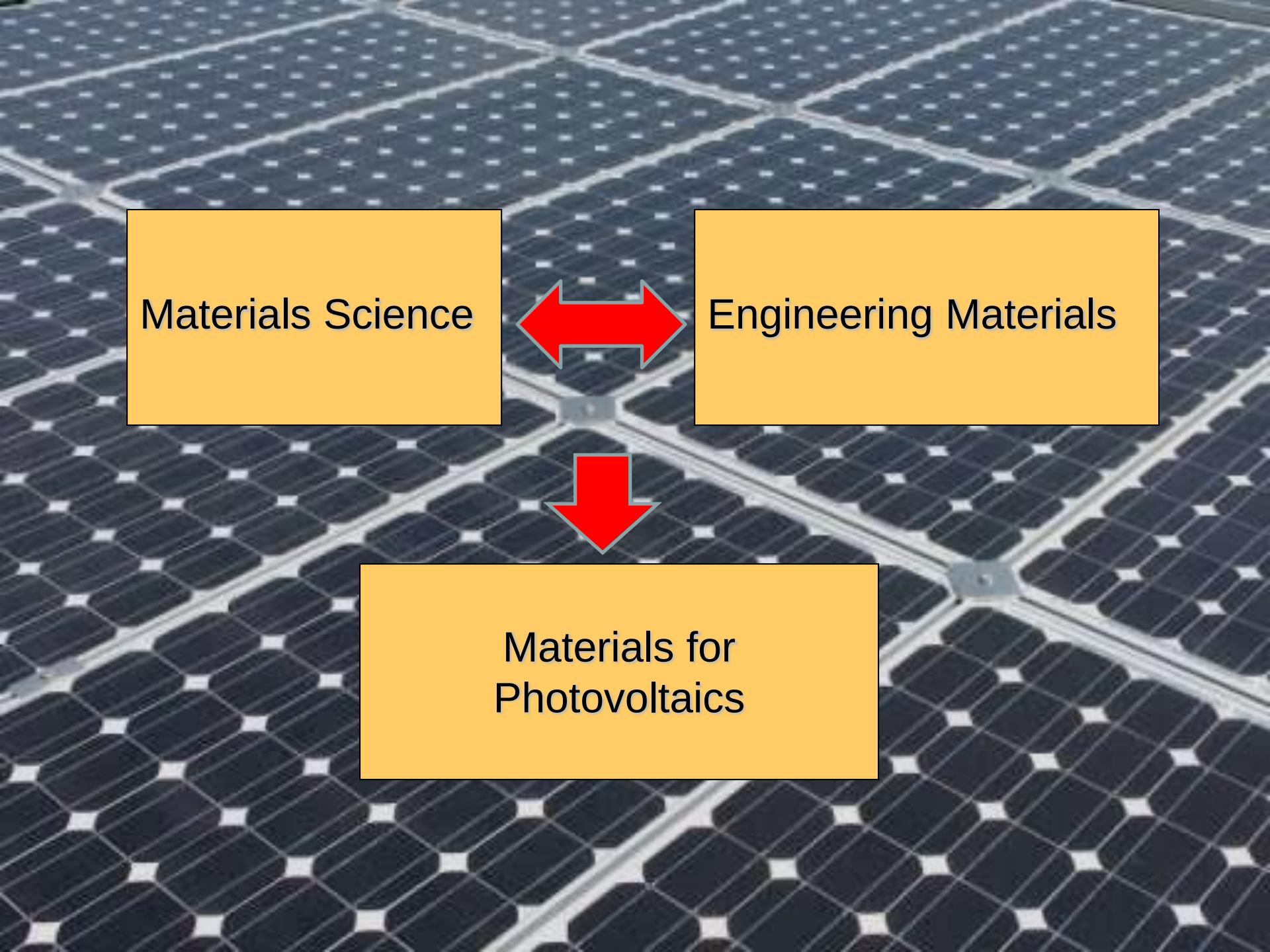
Nota: Quem tiver mais do 17 valores no teste ou no exame final terá que fazer um exame oral

Teste dia 30 de Maio de 2019 às 16:00

Relatório de laboratório (até à data do 1º exame)

PART 1

Materials


Materials Science
Engineering Materials
Materials for Photovoltaics

BIBLIOGRAPHY

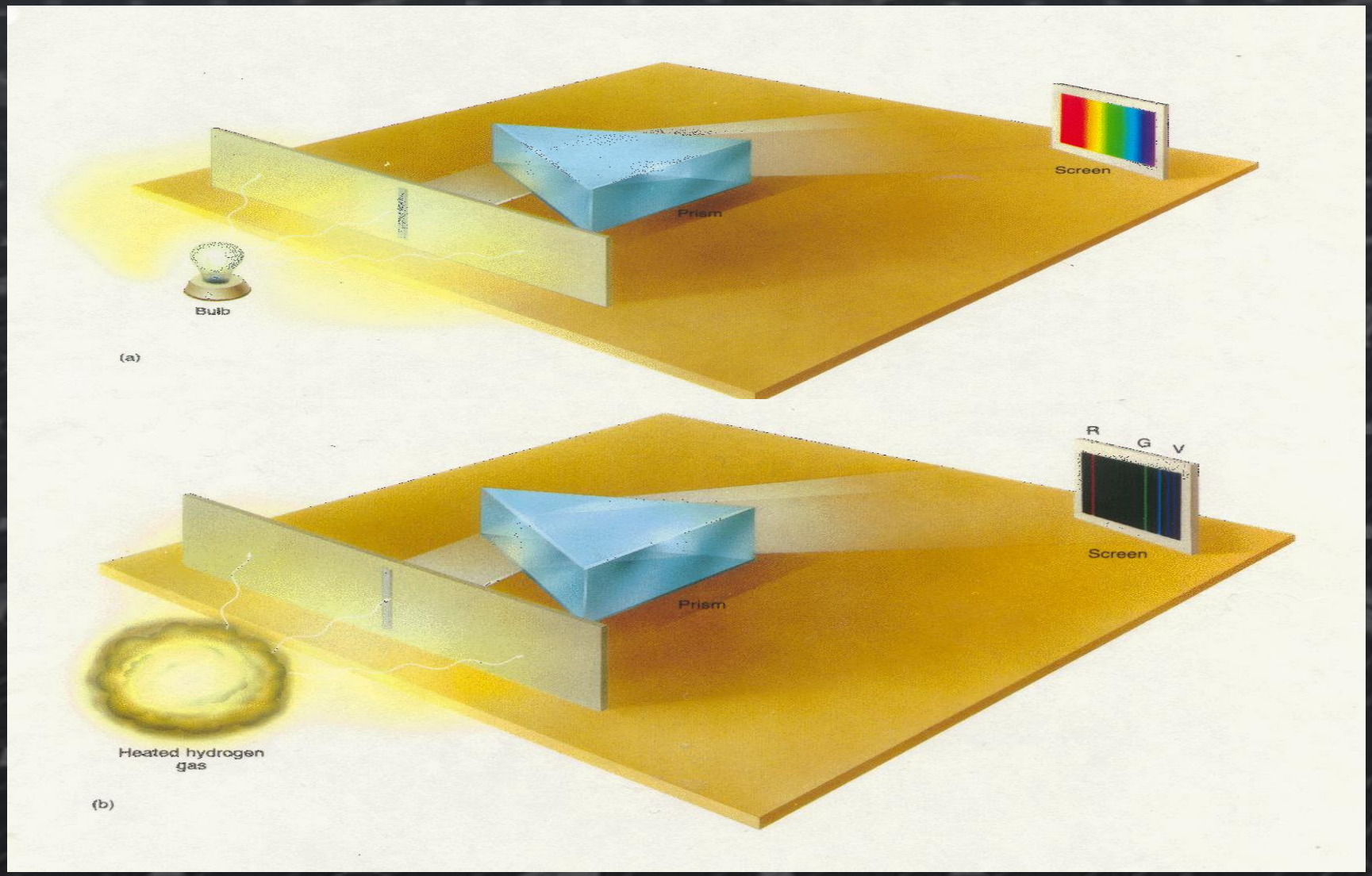
Introduction to Materials Science and Engineering, W. Smith, Ed McGraw Hill

Crystalline Silicon Solar Cells, A Goetzberger, Ed. J. Wiley

Handbook of Photovoltaic Science and Engineering, A. Luque, Ed. J.Wiley

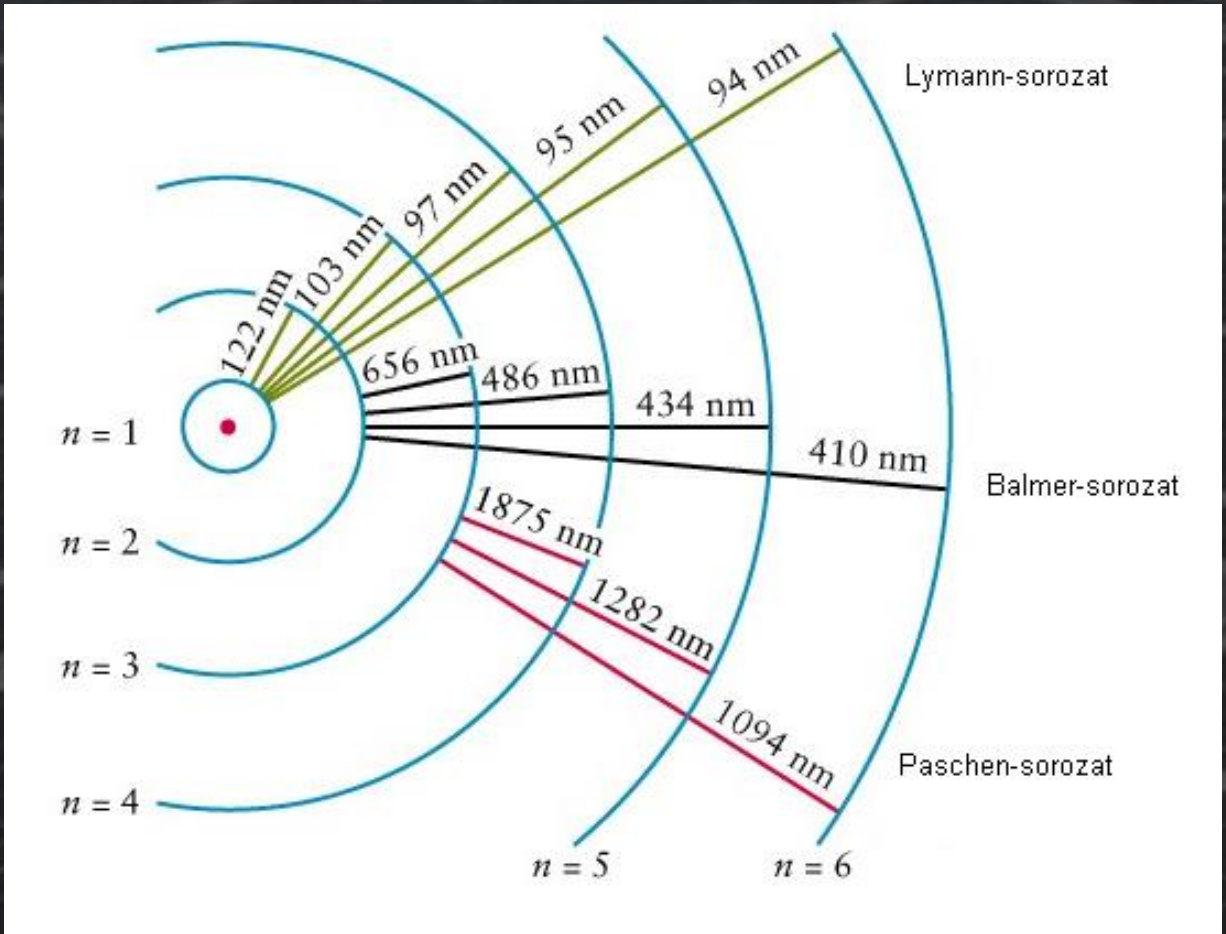
MATERIALS

Spectral decomposition of light



MATERIALS

Energy levels in hidrogen atom



Materials for photovoltaics

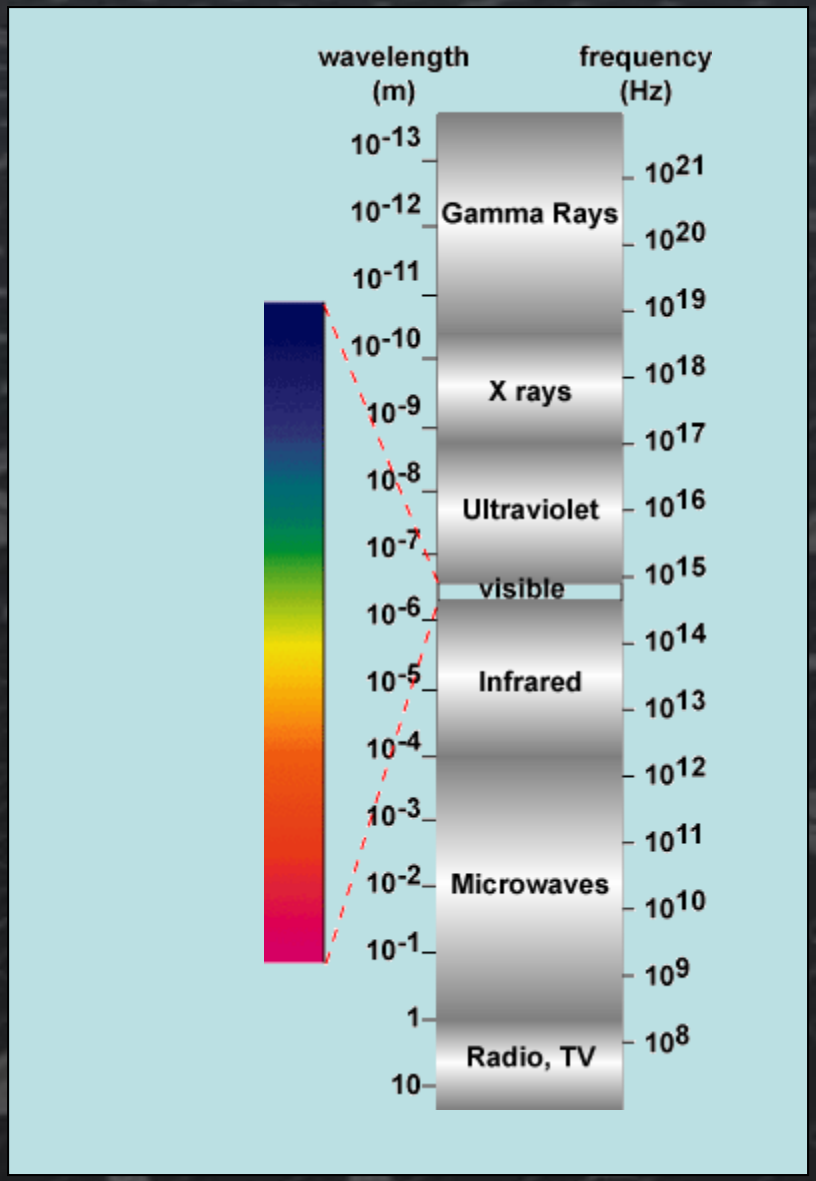
PHYSICS OF SOLAR CELLS

Properties of light

$$E = \frac{hc}{\lambda}$$

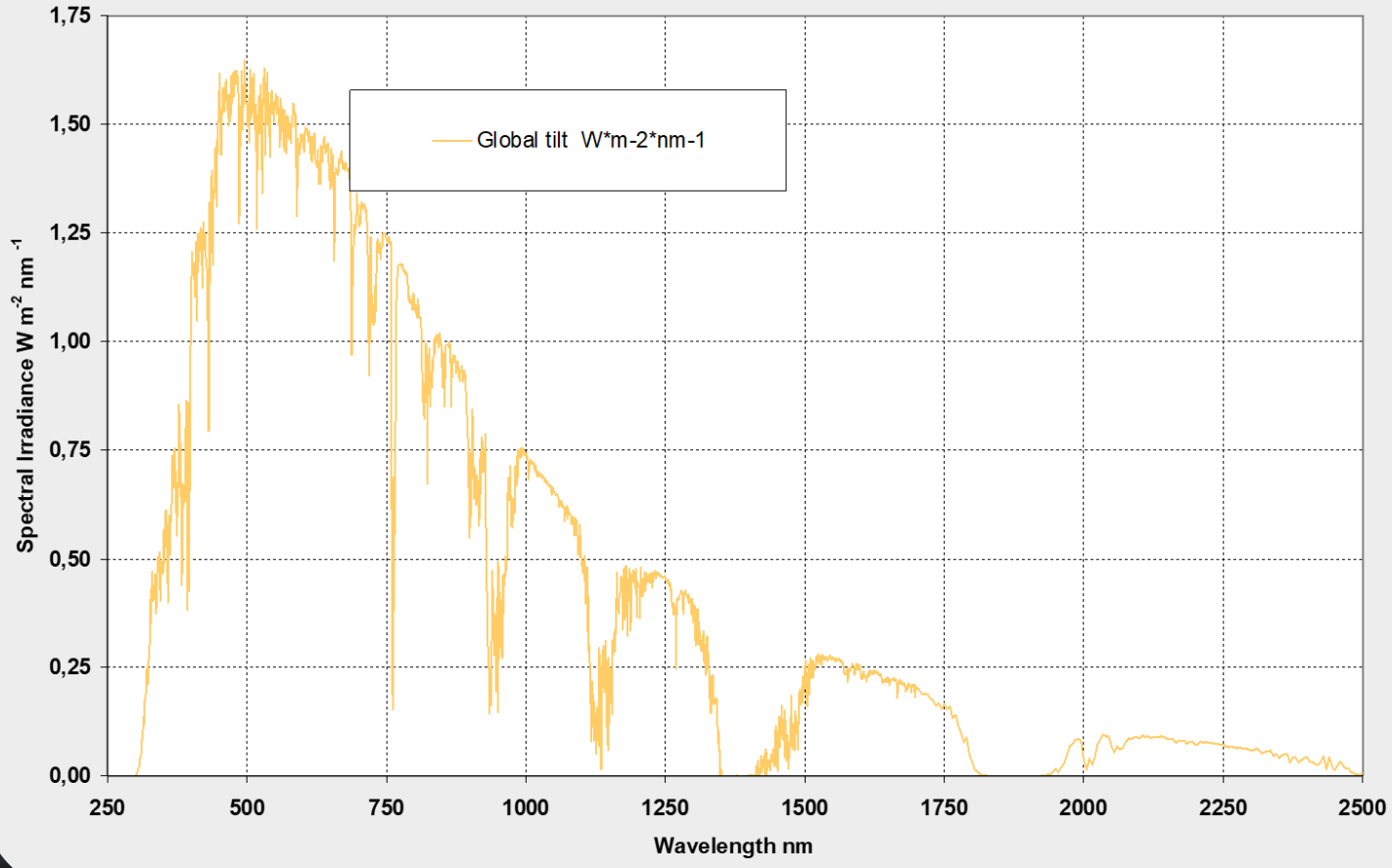
$$E(eV) = \frac{1.24}{\lambda(\mu m)}$$

1eV= 1.6E-19 J



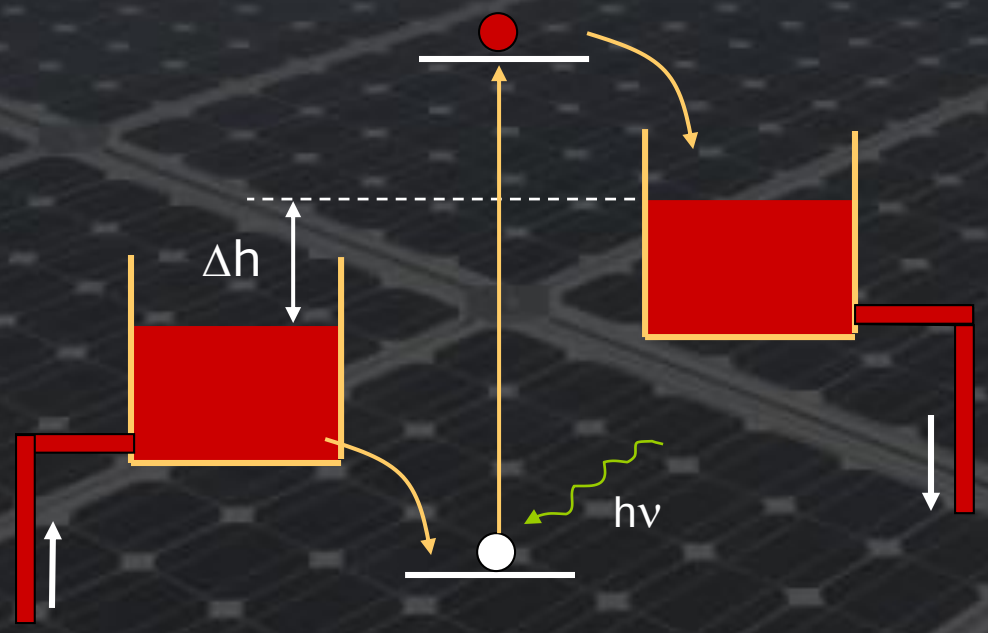
PHYSICS OF SOLAR CELLS

AM1.5 spectrum

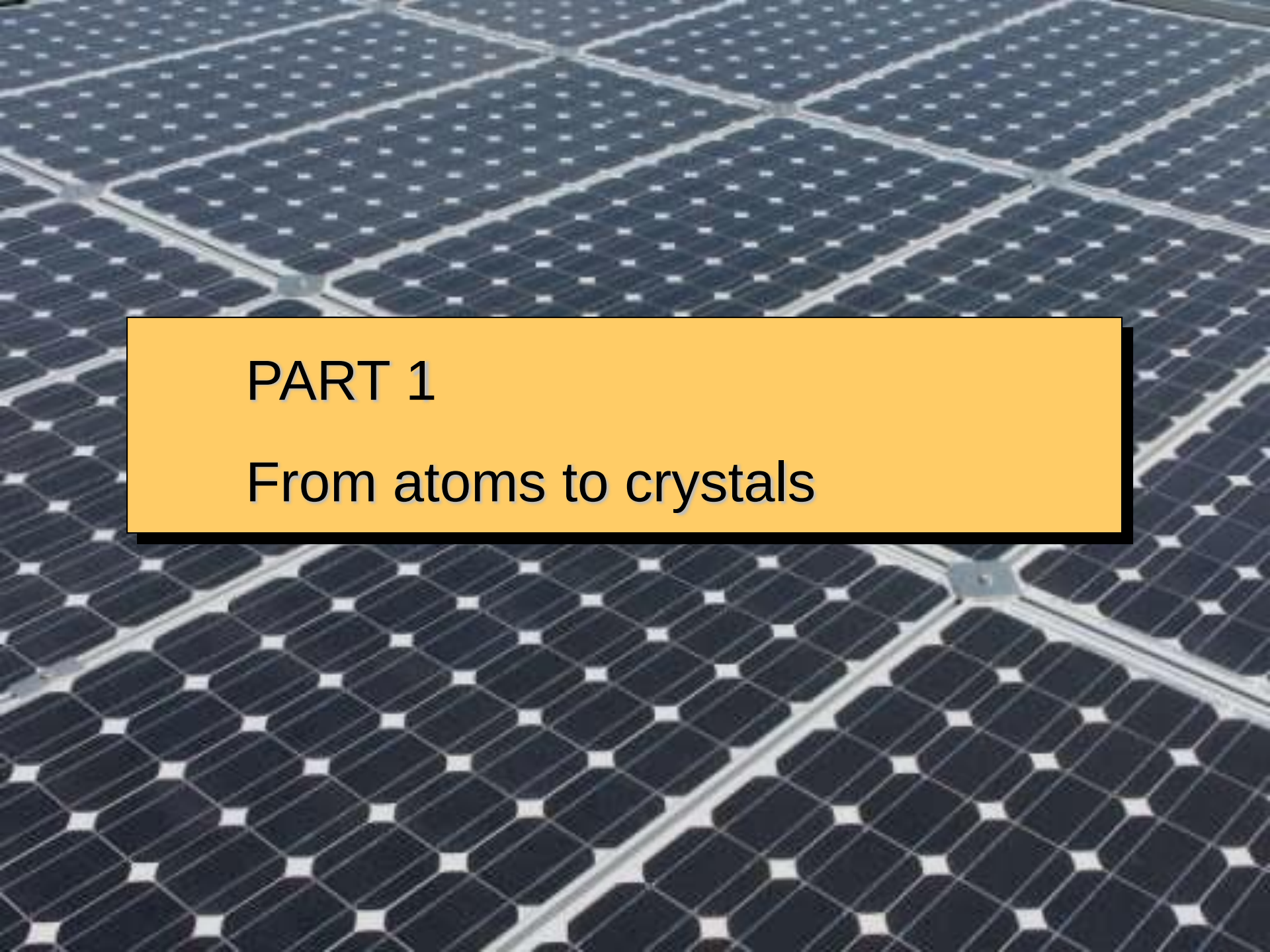


PHYSICS OF SOLAR CELLS

Generalized quantum converter



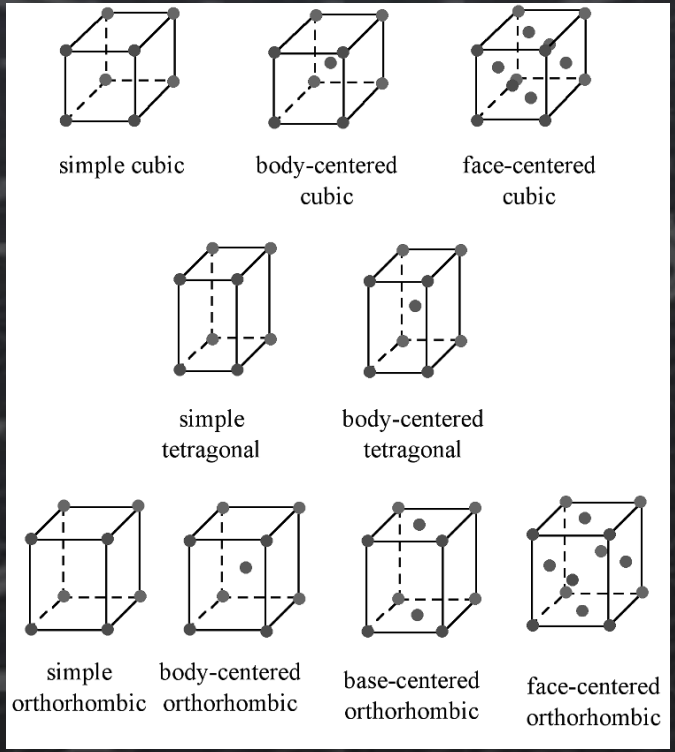
How light turns into electricity - creating charges
How does voltage and current appears – Charge Separation
How to collect charges - Collecting charges

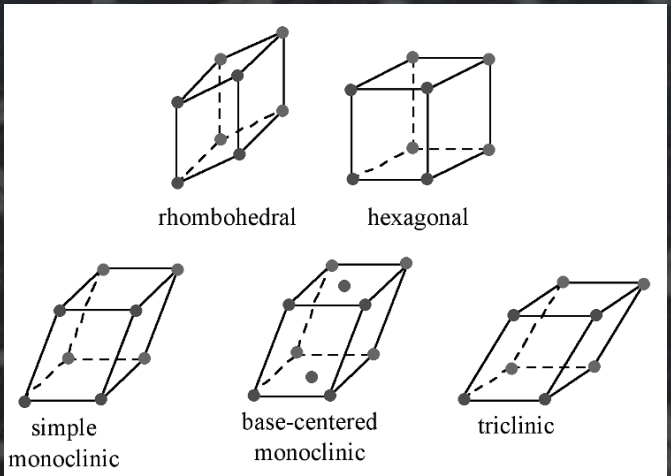


PART 1

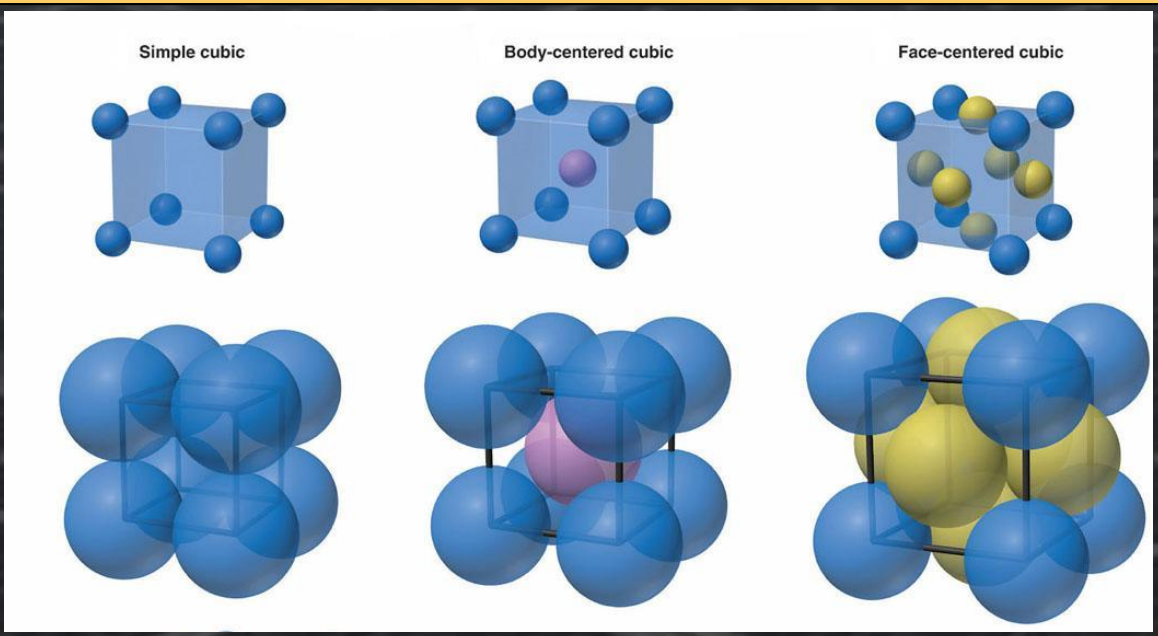
From atoms to crystals

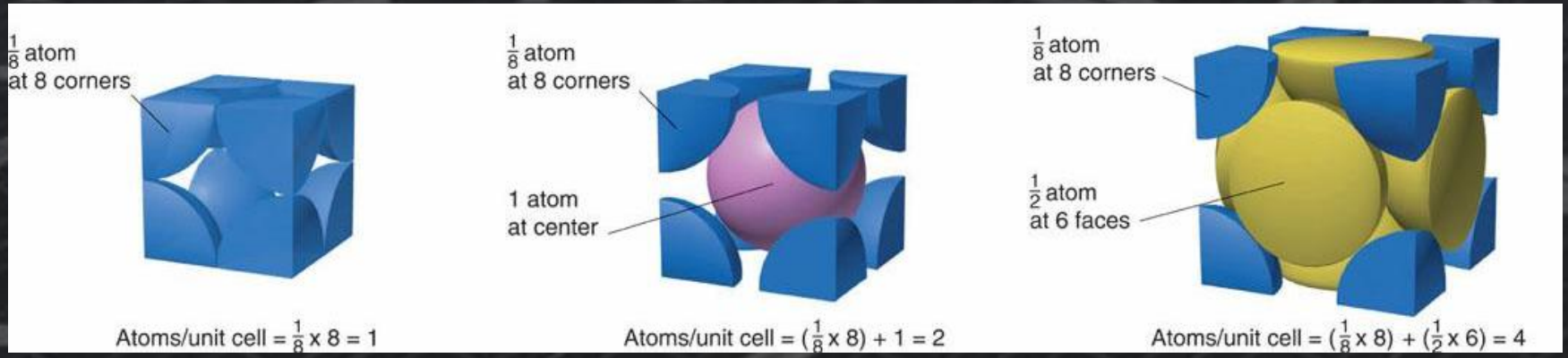
PHYSICS OF SOLAR CELLS



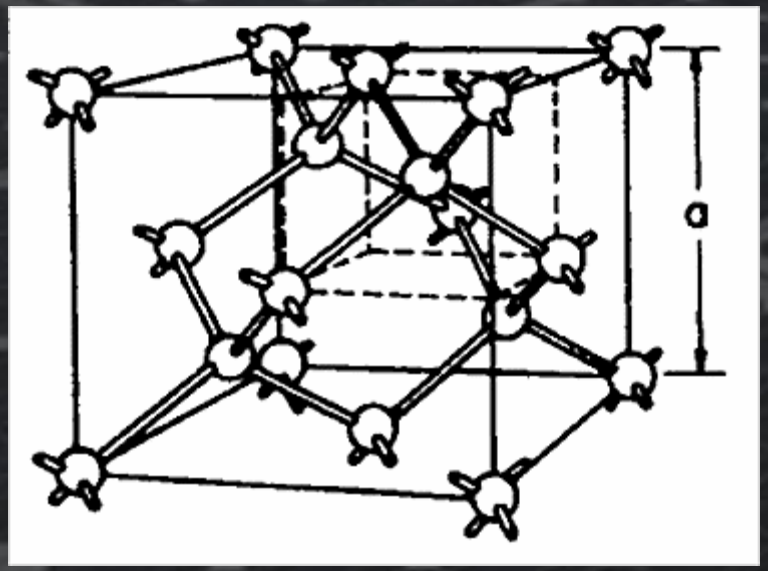


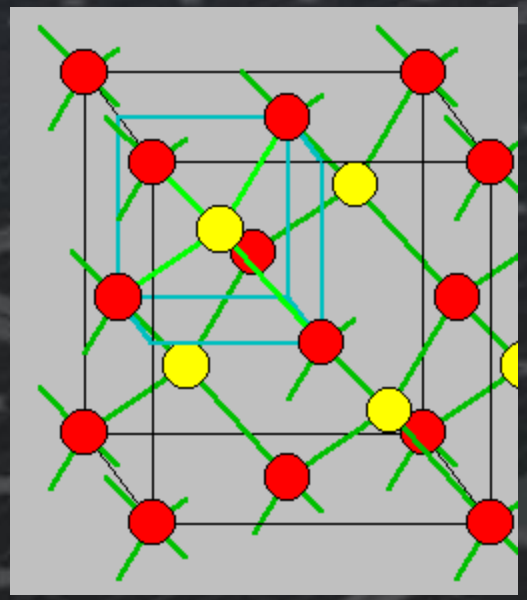
PHYSICS OF SOLAR CELLS



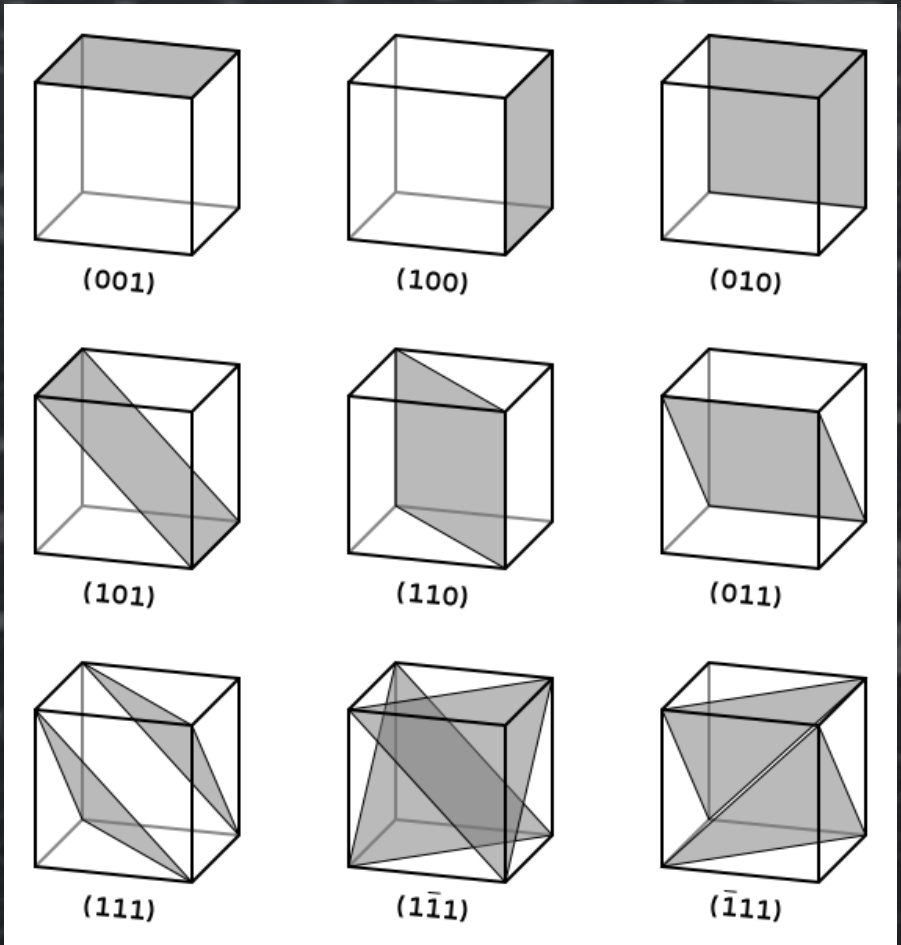


PHYSICS OF SOLAR CELLS

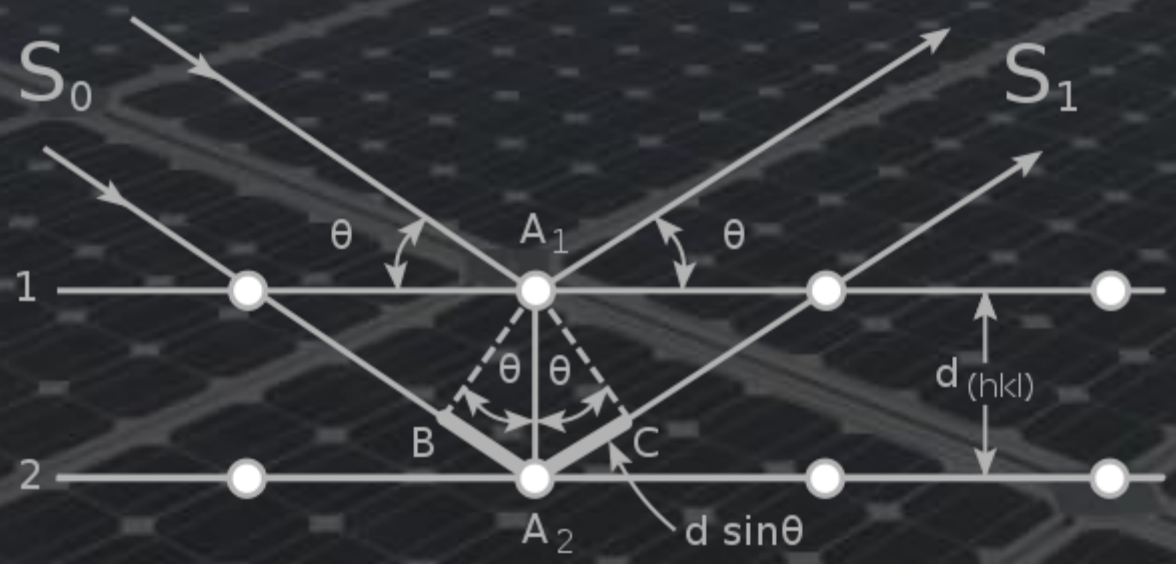




PHYSICS OF SOLAR CELLS

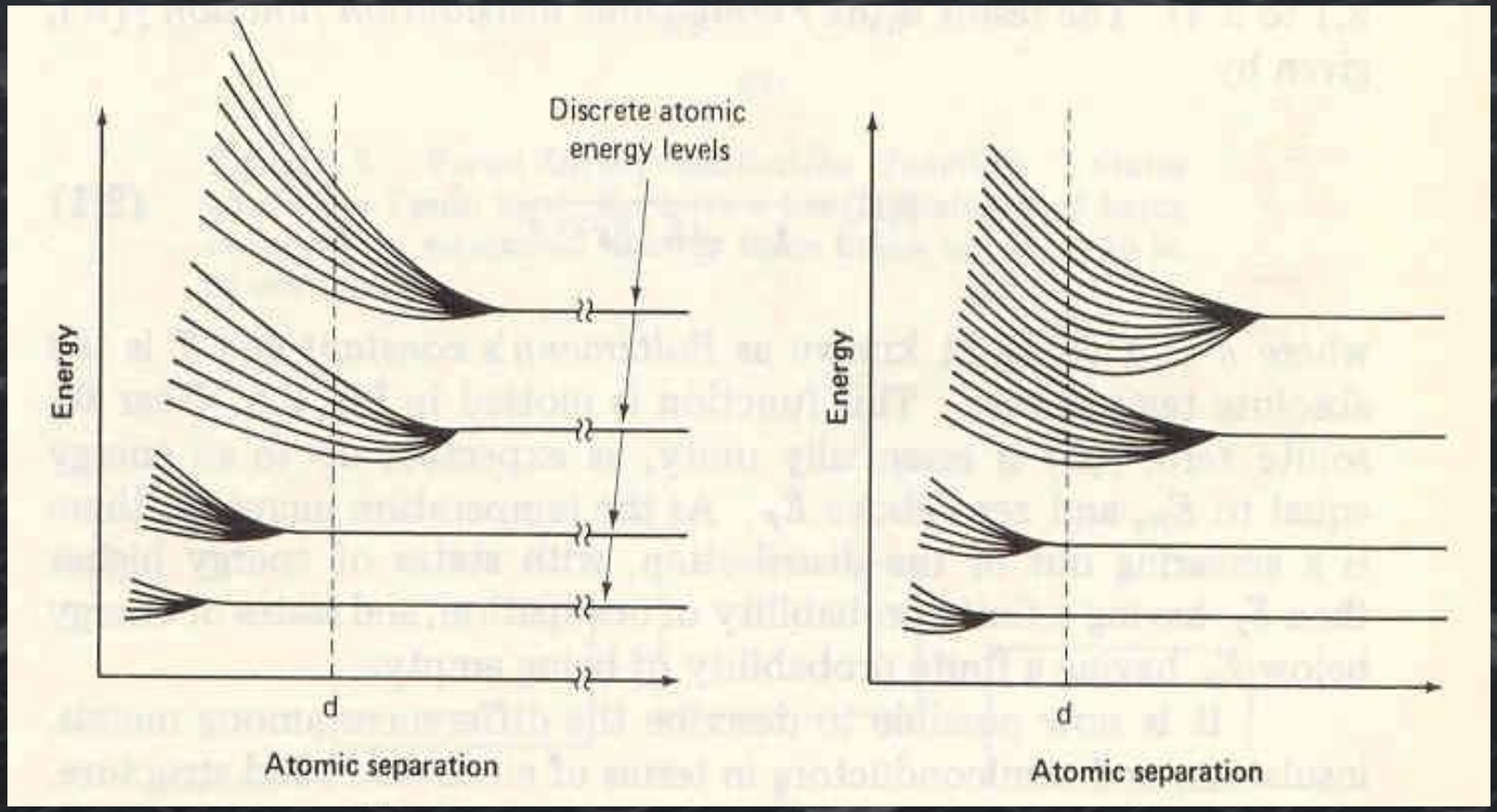


PHYSICS OF SOLAR CELLS



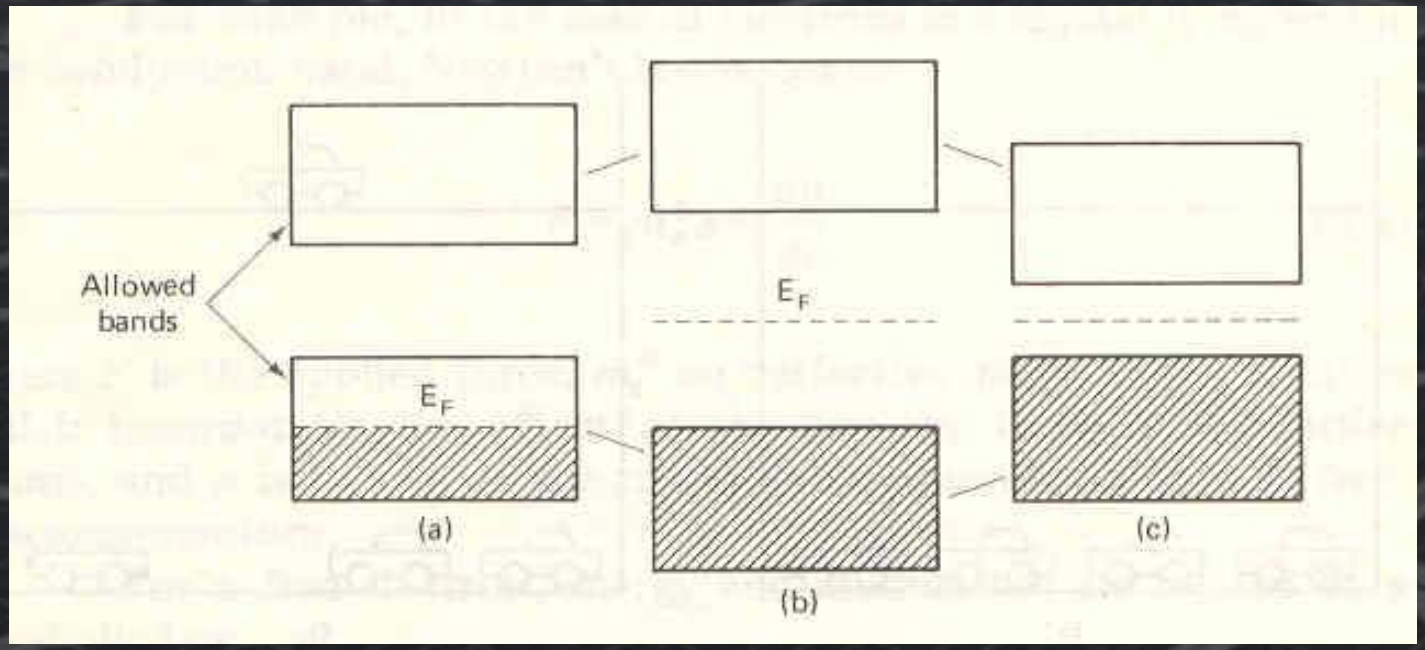
PHYSICS OF SOLAR CELLS

Formação das bandas de energia



PHYSICS OF SOLAR CELLS

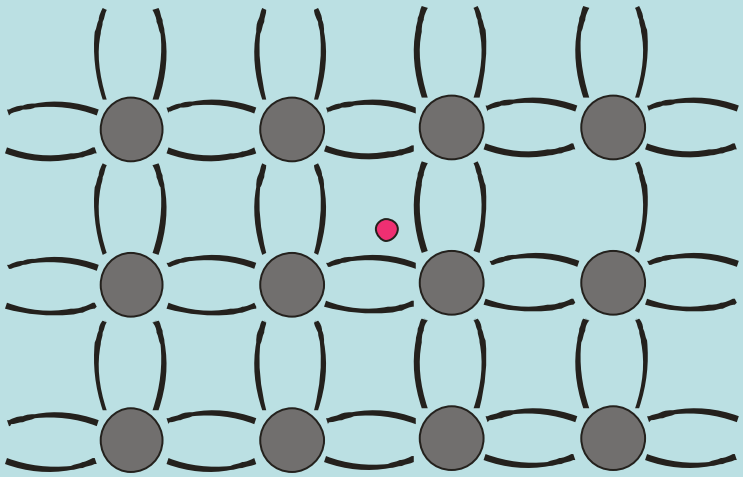
Formação das bandas de energia



a) Metal b)Insulator c)Semiconductor

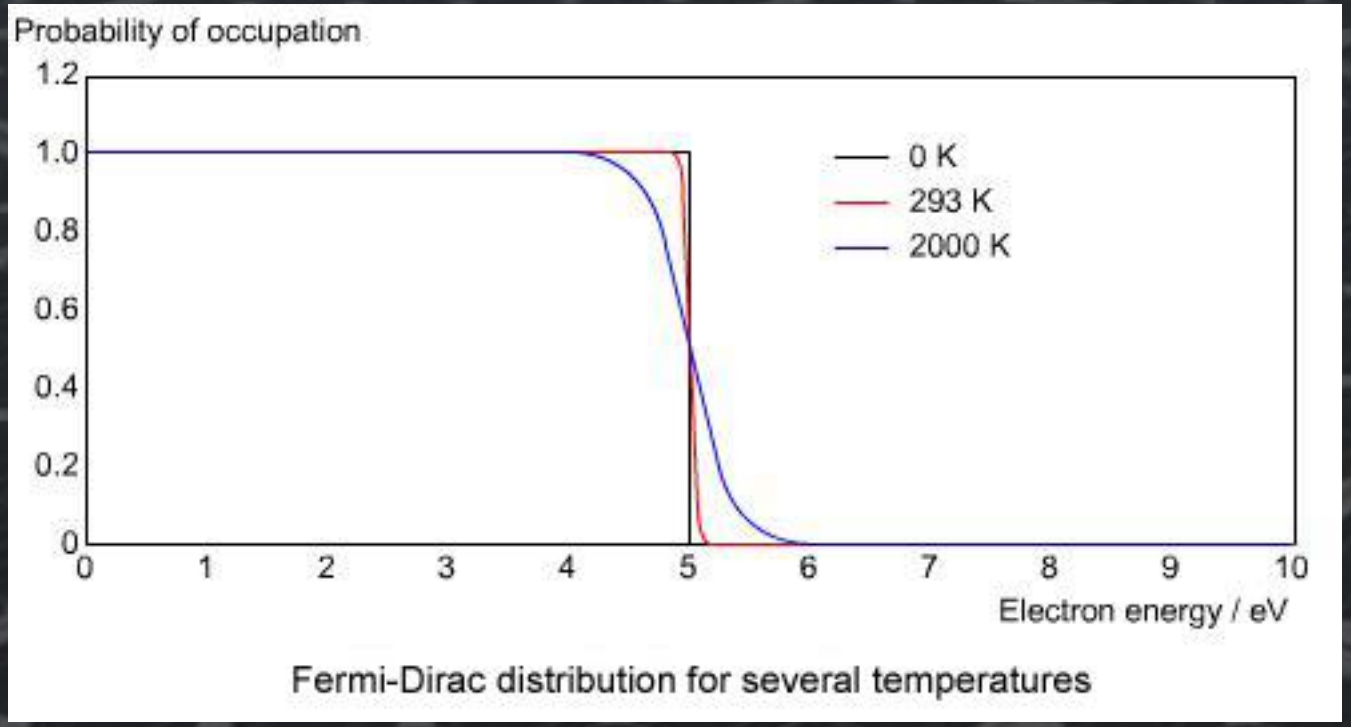
PHYSICS OF SOLAR CELLS

Formação de um par electrão-buraco



PHYSICS OF SOLAR CELLS

Formação de um par electrão-buraco



Fermi-Dirac distribution for several temperatures

$$f(E) = \frac{1}{e^{(E - E_F)/kT} + 1}$$

Explain the

PHYSICS OF SOLAR CELLS