



Canadian Association
of Physicists

Association canadienne
des physiciens et physiciennes

Contribution ID: 3671

Type: Oral (Non-Student) / Orale (non-étudiant(e))

Photon recycling in a solar cell with Lambertian surfaces

Wednesday 21 June 2023 16:15 (15 minutes)

An exact analytical expression for the probability of photon reabsorption and recycling in an idealized solar cell with Lambertian surfaces is derived. The existing approximations are found to agree with the exact formula to within a few per cent. The most accurate approximation turned out to be the simplest one that sets the reabsorption probability to the weak-absorption limit of the cell absorbance. The maximal photoconversion efficiency of a silicon solar cell is evaluated to be 29.5 % at the base thickness of $98 \mu\text{m}$ in a cell whose front and rear surfaces are Lambertian.

Keyword-1

silicon solar cells

Keyword-2

photon reabsorption

Keyword-3

photoconversion efficiency

Author: EVSTIGNEEV, Mykhaylo

Presenter: EVSTIGNEEV, Mykhaylo

Session Classification: (DCMMP) W3-3 Light and Matter | Lumière et matière (DPMCM)

Track Classification: Technical Sessions / Sessions techniques: Condensed Matter and Materials Physics / Physique de la matière condensée et matériaux (DCMMP-DPMCM)