

## Evaluation Guidelines

The procedures for all data analysis should be shown. For evaluation, unless explicitly specified, the general guideline is that the procedure is given ~ 60% of the points and the result is given ~ 40% of the points.

Question (1) : I-V curves without light illumination

Evaluation guidelines

- Correct electrical circuit diagram (1 point)
- Correct measured I-V curve (1 point)  
Please note whether there is an error analysis including reproducibility, errors due to measuring tools, and whether error bars are marked on the diagram.
- Correct analysis for obtaining the values of  $\beta$  and  $I_0$  (1 point)

Question (2) : The characteristics of the solar cell under fixed light illumination

Evaluation guidelines

- Correct electrical circuit diagram (1 point)
- Correct  $I_{sc}$ ,  $V_{oc}$  (1 point)
- Correctly measured I-V curve (2 points)  
Please note whether there is an error analysis, data reproducibility, and whether error bars are marked on the diagram.
- Correct maximum output power (2 points)
- Correct load resistance for maximum output power (0.5 points)
- Correct estimate of the filling factor (0.5 points)

Question (3) : The equivalent circuit diagram of the solar cell and I-V relationship

Evaluation guidelines:

- Correct circuit diagram (1.5 point)
- Correctly derived I-V relationship (1 point)
- Correct I-V relationship when  $R_{sh}$  and  $R_s$  are neglected (0.5 points)

Question (4) : Variation of  $I_{sc}$  and  $V_{oc}$  under different illumination light intensities

Evaluation guidelines:

- Correct usage of polarizers and filters to change the illumination light intensity (1 point)
- Correct measurement of  $I_{sc}$  and determination of the relationship between  $I_{sc}$  and light intensity (1.5 points)
- Correct measurement of  $V_{oc}$  and determination of the relationship between  $V_{oc}$  and light intensity (1.5 points)

Question (5) : Short-circuit current of the solar cell under different optical filters and intensities

Evaluation guidelines:

- Correct measurement of the short-circuit current of the solar cell under different optical filters and intensities (1.5 points)
- Correctly analyzing the longest response wavelength ( 1 points)
- Correctly inferring the semiconductor material that the solar cell is made of (0.5 points)