Novel Evaluation System of Multi-junction Tandem Solar Cell

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Description

Researchers at Kyoto University and the University of Tokyo have established a system to measure properties of each sub-cell of a multi-junction tandem solar cell.

For the development of multi-junction tandem solar cells, it is crucial to measure the properties of each sub-cell layer. However, currently available devices largely rely on simulations or parameter estimations to predict the properties of each sub-cell layer, thus could not measure the accurate values.

The innovation provides for a novel system to measure the absolute electroluminescence of each cell layer and evaluate them according to its formulation (Fig. 1). This system is capable of measuring I-V properties, the ratio of energy loss, the ratio of carrier loss and internal luminous efficacy, which indicates the quality of material.

Such accurate measurement results would provide a great ease to choose desirable material for each part of solar cells and optimize the structure of each layer, resulting in improving the efficacy of solar cell development.

Intellectual Properties

Appl. No.: JP20XX-XXXXXX
Applicant: Kyoto University

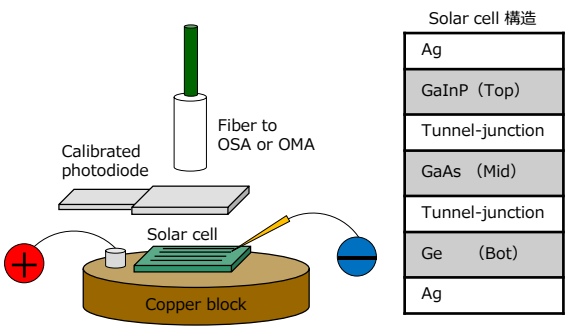


Fig. 1: Structure of the prototype device

Potential Applications

- Solar cell evaluation device
- Solar cell evaluation system

We are seeking a company to develop a device/software using this novel system.

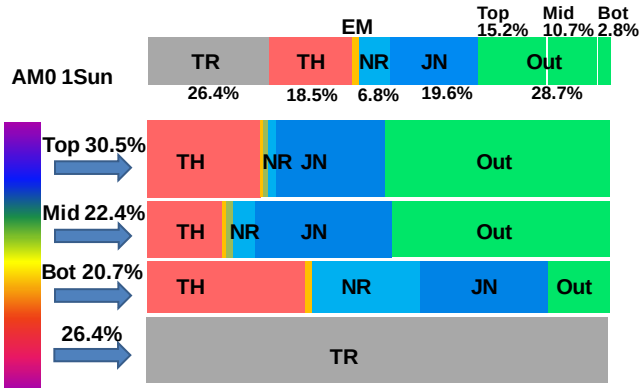
Advantages

- **Capable of measuring currently-unmeasurable properties of each cell layer:**
  - ✓ I-V properties
  - ✓ Energy loss ratio
  - ✓ Carrier loss ratio
  - ✓ Internal luminous efficacy*

  *Represents quality of the material
- **Highly accurate measurement**

Research Status

A software for the measurement is established, and its efficacy is verified with the laboratory-scale prototype device built on an open optical bench. Additional research for system development and further optimizations of the software is currently ongoing.



TR: Transmission loss
TH: Thermal loss
JN: Loss arising from voltage
NR: Loss resulting from non-light-emitting recombination
EM: Loss resulting from radiative recombination

Fig. 2: Measurement of internal energy balance of solar cell

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