

1. Construction of Academic Theory on “Module Science” Prof. Atsushi Masuda

Semiconductor modules are composed of ceramics, polymer films, and metals together with semiconductors. Those modules exposed outdoors such as solar cells are degraded by light irradiation, hygrothermal stress, high voltage, etc. accompanied with characteristic change in module materials. Chemical change in module materials occurs not only in the bulk but also at those interfaces. Therefore degradation phenomena are elucidated by microscopic analyses on interaction among module materials and also by various knowledges on material science and semiconductor physics. Novel academic theory on “module science” will be constructed in this study by sharing and arranging the obtained experimental results and accumulated knowledges.

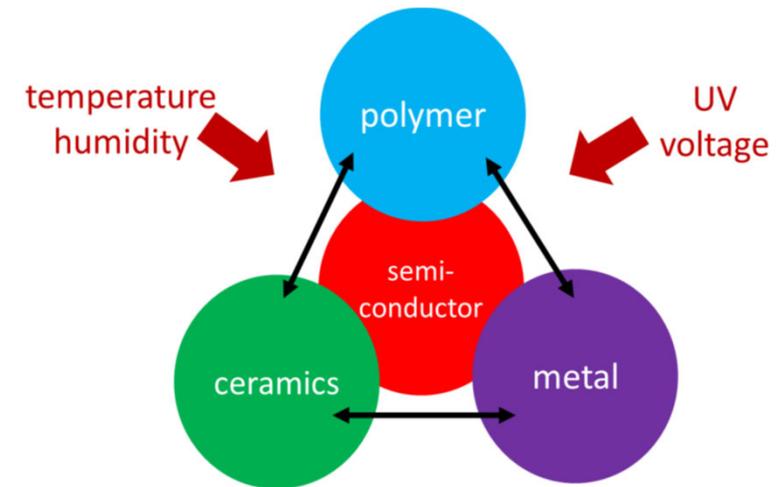


Fig. Concept of “module science”.

Requirements for students:

- 1) Not only pursuing truth but also constructing novel academic theory.
- 2) Enough knowledges on solar cells and photovoltaics.
- 3) Various knowledges on material science, especially on polymers.
- 4) Taking classes in quantum mechanics, solid state physics, electronic materials, and electronic devices.
- 5) Having a good taste in experiments.

Requirements for completion:

Presenting the research results in academic conference. Writing an academic paper is also welcomed.

Others: Those planning to pursue doctoral degree are welcomed.

2. Maximizing techniques for output yield of photovoltaics Prof. Atsushi Masuda

In order to maximize output yield of photovoltaics various indoor and outdoor tests will be performed. Four kinds of photovoltaic modules exposed at Kagoshima Prefecture are analyzed using photovoltaic performance data and weathering data. Change and degradation of module materials are also analyzed for photovoltaic modules exposed outdoors for a long time. Optimized semiconductor materials for absorption layer and photovoltaic module structures will be presented by those analyses. Coating techniques on the cover glass will be also developed for avoiding soiling and anti-reflection. Reliability for the coating is confirmed not only by outdoor exposure but also indoor acceleration test. Based on these experiments and analyses maximizing techniques for output yield of photovoltaics will be developed.



Fig. Photovoltaic modules (left), meteorological instruments (middle), and data acquisition systems (right) installed in Kagoshima Prefectural Institute of Industrial Technology.

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