

Area: Performance and Reliability of PV Modules.

A PERSPECTIVE ON THE WHOLE LIFE CYCLE OF PV MODULES

Donghwan Kim^{1,2,*}, Hae-Seok Lee², Yoonmook Kang², Soohyun Bae¹, Hyomin Park¹, Se Jin Park¹,
Jeongeui Hong³, Wonwook Oh⁴, Nochang Park⁴, and Sung Hyun Kim⁴

¹Department of Materials Science and Engineering, Korea University, Korea

²KU-KIST GreenSchool, Graduate School of Energy and Environment, Korea University, Korea

³Hanwha-Q Cells Korea, Korea

⁴Korea Electronics Technology Institute (KETI), Korea

As the photovoltaic industry becomes a global issue, volume of production and installation of PV modules is increasing every year. Recent plummeting of the module price accelerates the installation at a fast pace. Most research work has focused on improving the power output of the PV modules. Adoption of various types of cells and materials may pose new challenges in terms of the reliability. PV modules are required to retain more than 80% of the initial power after 25 years. The degradation of the module performance should depend on the weather, especially the humidity. Tools should be developed for a precise prediction of the module's degradation based on the weather condition. Degraded patterns developed in the service conditions should also be studied for the understanding of the degradation mechanisms and for improving the reliability performance. Analysis on the degradation becomes more and more important as new materials and processes are adopted to decrease the manufacturing cost and increase the power output. Environmental regulation such as lead-free solder should also be seriously considered in terms of the reliability as well as the cost. Finally the recycling technology for PV modules should be developed before the world is overwhelmed with the old modules. In this presentation, some issues will be discussed to be considered at each phase of the PV module life cycle such as the power degradation modeling, the corrosion, and the recycling of the panels.