

**Section of
Public Relations**

Hyo Jung Kim
Section Chief
(+82) 62-715-2061

Nayeong Lee
Senior Administrator
(+82) 62-715-2062

**Contact Person
for this Article**

Professors Heejoo Kim
Institute of Integrated Technology
(+82) 62-715-3202

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Professors Heejoo Kim and Kwanghee Lee's research team finds clues to improve the lifespan of perovskite solar cells vulnerable to light (National Research Foundation of Korea)

- Solar cells absorb light and turn it into electricity. But what if the core material used in solar cells is vulnerable to light?
 - This is the story of perovskite solar cells * that suffer from difficulties in commercializing its energy conversion efficiency, which is comparable to commercial silicon solar cells, due to their vulnerability to light, heat, air, and moisture.
 - * perovskite solar cell: a thin film solar cell based on a mixture of an organic substance and a metal having a perovskite crystal structure and has a wide range of light bands that can absorb be absorbed well
- The high energy conversion efficiency as well as the low-temperature solution process has provided a clue to overcome the low light stability of perovskite solar cells, which are considered as candidates for next-generation solar cells.
 - A research team led by Professors Heejoo Kim and Kwanghee Lee of the Gwangju Institute of Science and Technology (GIST, President Kiseon Kim) has confirmed that surface re-crystallization can remove defects in perovskite thin film and increase light stability.

- Previously, attempts have been made to increase stability by adding metal ions or introducing an oxide film to harden the perovskite crystals.
 - This was due to the premise that the perovskite device itself has low stability.
- However, the research team focused on improving the process of manufacturing the thin films rather than the stability of the perovskite itself.
 - When light is applied to drive the solar cell, defects generated in the process of making crystals into thin films move to the thin film surface, which was intended to prevent the corrosion of the electrode itself.
- The research team introduced a functional layer of organic material that will adsorb defects that have migrated to the perovskite thin film surface in response to light.
 - When the organic material layer is stacked on the perovskite thin film and stored in a high vacuum state, defects on the surface of the thin film move to the surface and are adsorbed on the organic material layer.
- The perovskite thin film, which has been cleared of such defects, is re-used as a solar cell by connecting a new organic layer and electrodes.
 - The solar cell made of perovskite thin film in which actual defects are removed has maintained device performance of 80% or more even when exposed to sunlight containing ultraviolet rays or heat of 85°C for 1,000 hours.
- Based on the results of this study, which has found clues to solve the problem of light stability, which is the obstacle to commercialization of perovskite solar cells, the research team will proceed with research on mass production technology to quickly remove defects on the surface of perovskite.
 - The results of the study, which was conducted with support from the Ministry of Science and ICT, the National Research Foundation of Korea, and the GIST Research Institute, were published on February 17, 2020, in *Energy & Environmental Science*, an international journal for environmental and academic studies.

