Breakthrough new material increases solar panel efficiency and longevity

A new composite material can passively cool solar panels, increasing power output by 12.9% and extending their lifespan by more than 200%.

A new composite material can passively cool solar panels, increasing their power output by 12.9% and extending their lifespan by more than 200%. This is the achievement recently announced by an international research team led by King Abdullah University of Science and Technology (KAUST) in Saudi Arabia.

Scientists have developed an acrylate-based composite material that improves solar cell performance. When applied to panels installed in a country with high temperatures like Saudi Arabia for several weeks, the material significantly increased power output and lifespan, while reducing the power consumption of the panels themselves.

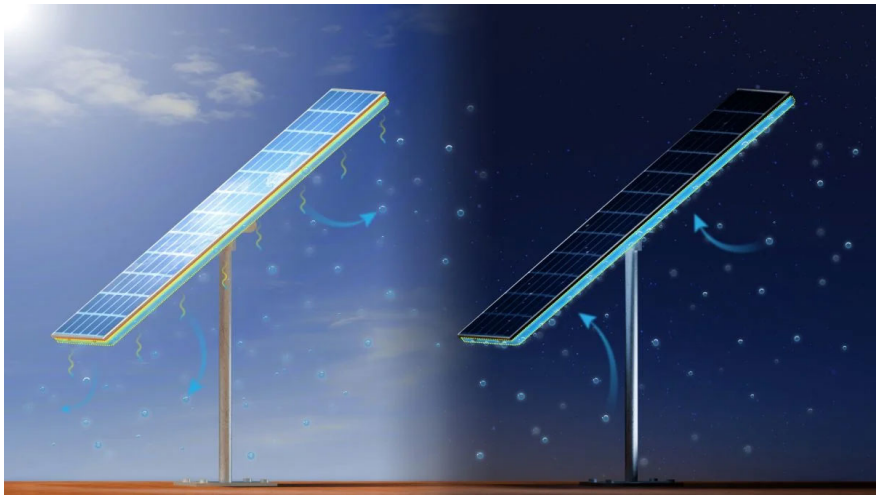
Solar energy is at the heart of global green economies, accounting for more than three-quarters of total installed renewable energy capacity. However, providing a stable and long-term supply of solar power poses a major challenge.

Current commercial solar cells can only convert about 20% of light into electricity, the rest is absorbed as heat or reflected. This heat reduces efficiency and shortens the life of the cell, leading to premature replacement. Therefore, cooling solutions are necessary, but traditional systems such as fans or pumps consume electricity. Passive cooling is an alternative that consumes no energy.

Speaking about this issue, Professor Qiaoqiang Gan, head of the research team, said:

> We specialize in developing passive cooling materials that are thin and light, and can be applied to a variety of cooling systems such as greenhouses or solar panels without compromising performance.

The team created a desiccant composite sheet from lithium chloride (LiCl) and sodium polyacrylate. The material absorbs moisture from the air at night and releases it during the day. Unlike other cooling desiccant materials, polyacrylate is a cheap polymer, and the manufacturing process does not require toxic chemicals or specialized reagents, which significantly reduces costs.



When operated for weeks in the Saudi Arabian desert, solar cells coated with the new material offered the following advantages:

1. Temperature reduction: 9.4°C lower than conventional batteries
2. Increased power output: >12.9%
3. Extended life: >200%
4. Reduce electricity production costs: ~20%

Testing was also conducted in the coldest regions of the United States in rainy conditions, proving its effectiveness in all environments.

It is still too early to talk about commercialization, but the new material promises to pave the way for the prospect of increasing solar cell efficiency in harsh climates, while helping to reduce maintenance and replacement costs, as well as promoting a highly economical renewable energy transition.