

Smart window technology that automatically changes color by sunlight

May 28 2020

Conceptual diagram of technology



This technology can control the transmittance of light by automatically adjusting the intensity of sunlight. It can manufacture high-performance smart windows by applying low-cost material process can be applied and. (photochromic devices based on electrochromic device) Credit: Korea Institute of Energy Research (KIER)

Smart window technology that can automatically adjust the amount of sunlight entering the room by changing the color of the window depending on the intensity of sunlight has been developed by a domestic research team.

The research team of Dr. Han Chi-hwan of Korea Institute of Energy Research (KIER) succeeded in developing a smart window technology which does not need power, by inserting a light absorbing layer that can generate electromotive force into an [electrochromic](#) device. This new smart window technology can lower prices by 30% to 50% or more, compared to existing products.

The light-sensitive automatic color conversion smart window technology combines solar cell technology and electrochromic technology. It can simultaneously solve the need for a separate power supply and high production costs which are disadvantages of existing electrochromic technology. In addition, it can control the intensity of sunlight and dramatically reduce the energy used for lighting by 30% to 40% or more as a future smart window technology.

Existing electrochromic smart window products were not revitalized in the market due to their expensive price and the difficult construction for connecting electric wiring to these windows. However, since the photosensitive automatic color conversion smart window technology contains a light absorbing layer in the device, there is no need for a separate power supply, and it can also reduce prices because it does not use expensive conductive glass during production.



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Sunroof



Energy Saving Window

(1)Applications: Construction, Automobile, Personal sports goggles. (2)Applied products: Visible light and IR light transmittance modulating smart windows for buildings, Car sunroof, Personal sports goggles. Credit: Korea Institute of Energy Research (KIER)

The light-sensitive automatic color conversion smart window has better ability to block sunlight when it is stronger, so it can be applied to large buildings with high cooling costs by blocking visible light as well as IR light transmission in summer. In addition, this excellent technology does not require a separate power supply, and it can be applied to existing buildings, thus expanding the marketplace.

The research team has succeeded in developing not only the glass but also filming technology, and they are also making a product that can attach to and detach from existing window glasses. If the development of film-type products is successful, it is expected to expand not only to

buildings, but also to various markets such as automobiles, ships, and aircraft.

Dr. Han Chi-hwan, researcher of the photovoltaics research department of KIER and the head of this project said, "As the government has established a road map that obligates zero-energy buildings starting in 2020, this photosensitive automatic color conversion smart [window](#) technology has the effect of blocking heat when [sunlight](#) is strong, so it can improve the energy efficiency when applied to a zero-energy [building](#). It is also expected to contribute to the construction of a future smart city by combining solar cell technology and electrochromic technology into one."

Provided by National Research Council of Science & Technology

Citation: Smart window technology that automatically changes color by sunlight (2020, May 28) retrieved 5 May 2024 from

<https://techxplore.com/news/2020-05-smart-window-technology-automatically-sunlight.html>

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