



TECHNOLOGY

Self-Powered, Switchable Solar Windows

OVERVIEW

Background:

Many optoelectronic devices, such as smart windows, have the ability to electrically control transparency of the window and the scattering of the transmitted light. The main drawbacks to current smart windows are that they are not able to generate power and often allow unwanted optical absorption. Alternatively, building integrative photovoltaic windows can provide power; however, these windows all encounter the basic trade-off between photovoltaic efficiency and transmissivity, which must be decided prior to installation. There is an interest in developing windows that provide both the benefits of solar windows and the benefits of smart windows so that buildings, houses, and other structures can be provided with the most efficient renewable energy options.

Innovation:

Researchers at the University of Maryland have developed a novel solar smart window device that is able to selectively switch between a more transmissive state (transparent) and a less transmissive state (opaque) while simultaneously generating power in both states. These PDLCs, when in an 'off state' (no applied voltage) appear hazy or opaque and thus, in a building setting, would reflect more light at the surface enabling privacy, building cooling, higher power generation, and dramatically reduce building cooling costs. These PDLCs, when in the 'on state' (voltage applied), appear transparent, and thus, in a building setting, will provide controllable lighting, solar heating, and save on building lighting costs.

Applications:

- Building-integrated photovoltaics (BIPV)
- House windows (all structure windows)

APPLICATIONS

- Building-integrated photovoltaics (BIPV)
- House windows (all structure windows)
- Car windows

ADVANTAGES

- Both smart window and solar cell window properties in on and off states
- Control both solar heating or cooling
- Control room lighting
- Privacy
- Reduced radiative heating
- Self powering (generates power)
- Saving building cooling costs

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Additional Information

INSTITUTION

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PATENT STATUS

Pending

CATEGORIES

- Engineering
- Materials
- Power Electronics
- Devices

EXTERNAL RESOURCES

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