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Smart Windows and Tunable Optical Elements Incorporating Phase Changing Oxide Quantum Materials

A highly efficient, multi-layer electrochromic material enables smart windows with sub-second switch rates for reduced energy and lighting costs in buildings and vehicles.

Smart windows are becoming popular in vehicles and buildings because of their ability to control the amount of heat and light transferred through the window. In addition to the convenience factor, they allow for cost-saving potential with regard to light costs and energy consumption. Some electrochromic materials take a considerable amount of time to change their transparency, leading to inefficiencies, and ultimately higher costs or a lack of optimization when reducing costs.

Researchers at Purdue University have developed an electrochromic material for use in smart windows to reduce the cost of energy consumption and light costs. Using a multi-layer configuration, the windows are capable of rapidly modulating the transfer of light in response to an electrical stimulus. Compared to its counterparts, this window is more efficient and boasts a faster switch rate. When powered by battery, the response times for coloring and bleaching were all less than 1 second.

Advantages:

-More Energy Efficient

-Faster Switch Rate

-Convenient Fabrication Process

Potential Applications:

-Buildings

-Automobiles

-Aircrafts

Technology ID
2018-RAMA-68319

Category
Buildings, Infrastructure, & Construction/Smart Building Systems & Automation
Materials Science & Nanotechnology/Advanced Functional Materials

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TRL: 1

Intellectual Property:

Provisional-Patent, 2018-08-09, United States | PCT-Patent, 2019-08-07, WO | NATL-Patent, 2021-02-04, United States

Keywords: Smart windows, electrochromic material, energy efficient windows, faster switch rate, light modulation, cost-saving windows, dynamic glass, switchable glass, multi-layer configuration, rapid light control