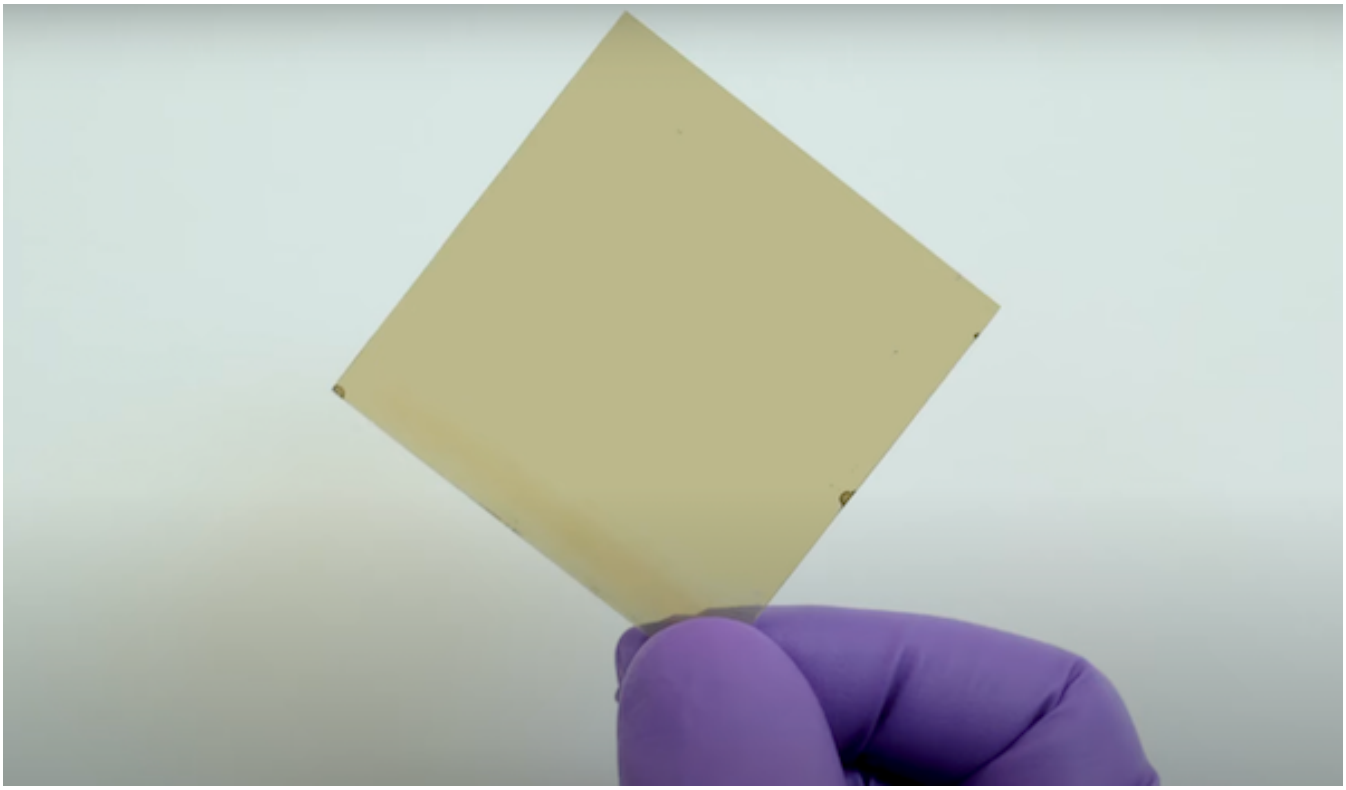
# Energy-Saving Glass That 'Self-Adapts' To Weather Could Replace A/C & Heating

By Alexa Heah, 04 Jan 2022



Video screenshot via Nanyang Technological University

**Researchers at** the Nanyang Technological University (NTU) in Singapore have invented a type of energy-saving glass that can "self-adapt" to changing temperatures.

**The findings,** which were published in the journal Science, showed that the glass automatically responded to differences in temperature, switching between heating and cooling modalities.



**According to *WION*,** the glass makes use of light spectrums to either heat up or cool down, eliminating the need for electrical components altogether. The team created the material's structure out of layers of vanadium dioxide nanoparticles composite, poly(methyl methacrylate) (PMMA), and a low-emissivity coating.

**In the summer,** the glass is able to cool the room by minimizing near-infrared light, which causes heating; and enhances the effect of long-wave infrared light, which conversely

creates radiative cooling. When the seasons change, the material adapts to do the opposite in order to warm the room.



**Experiments conducted** by the team found that the glass could control the amount of heat it emitted in various instances, ranging from regular room temperature to above 70°C (158°F), proving the material could dynamically adapt to a wide range of changing conditions.





***The Brighter Side of News*** reported that in the United States, the heating and cooling of windows in buildings makes up 4% of the total energy usage each year. While other scientists have come up with methods to either heat or cool rooms, such as tinted windows, this is the first solution that can both regulate heating and cooling at the same time.

**"Most energy-saving** windows today tackle the part of solar heat gain caused by visible and near-infrared sunlight," said Dr Long Yi from the NTU School of Materials Science and Engineering (MSE).

**“However, researchers** often overlook the radiative cooling in the long-wavelength infrared. While innovations focusing on radiative cooling have been used on walls and roofs, this function becomes undesirable during winter,” he explained.

**“Our team** has demonstrated for the first time a glass that can respond favorably to both wavelengths, meaning that it can continuously self-tune to react to a changing temperature across all seasons.”