Photos showing the window in the before (cool) and after (hot) state | Photo source NTU

GEL-FILLED WINDOWS REDUCE HEAT, GLARE, ENERGY USE AND SOUND

SCIENCE

Researchers have developed windows filled with hydrogel that can block the sun and trap thermal heat for later release

Spotted: First, there were double-glazed windows, then triple-glazed. Now, a team of researchers at Singapore's Nanyang Technological University (NTU) has developed smart, liquid-filled windows. The panel can simultaneously block the sun while trapping thermal heat. This heat can then be released later and used to heat the building, reducing energy consumption.

The researchers developed the panel by sandwiching a hydrogel-based liquid between glass panels. The hydrogel mixture turns opaque when exposed to heat, blocking the sunlight. At the same time, the high heat capacity of the water allows the gel to store a large amount of thermal energy, rather than transferring it through to the glass and into the building. At night, the stored heat is gradually released until the liquid turns clear.

Conventional energy-saving windows use expensive coatings that reduce the amount of infrared light that can enter a building through the glass. One drawback, however, is that they do not regulate visible light, which can also cause buildings to heat up. By turning opaque in the presence of visible light, the hydrogel windows can block it.

Lead researcher Wang Shancheng pointed out that the windows also reduce sound

transmission, saying, “Sound-blocking double glazed windows are made with two pieces of glass which are separated by an air gap. Our window is designed similarly, but in place of

air, we fill the gap with the hydrogel-based liquid, which increases the sound insulation between the glass panels, thereby offering additional benefit not commonly found in current energy-saving windows.”

Sustainable building design is an important step towards creating sustainable cities. As they are a key entry point for letting in heat, creating more efficient windows is an important component in sustainable building. At Springwise, we have seen a number of innovations in sustainable windows, including those that double as solar cells and the water-filled type.

Takeaway:

In tests, the smart liquid window was able to shift the "temperature peak" inside a room by around two hours. This means that using the windows could delay the time that electrical power is needed to warm or cool a room by two hours. This may seem small, but it could actually make a huge difference when used in large buildings. The next step for the research team is to find industry partners to help them turn the smart window into a commercial product. In the future, this could become a standard in building design.