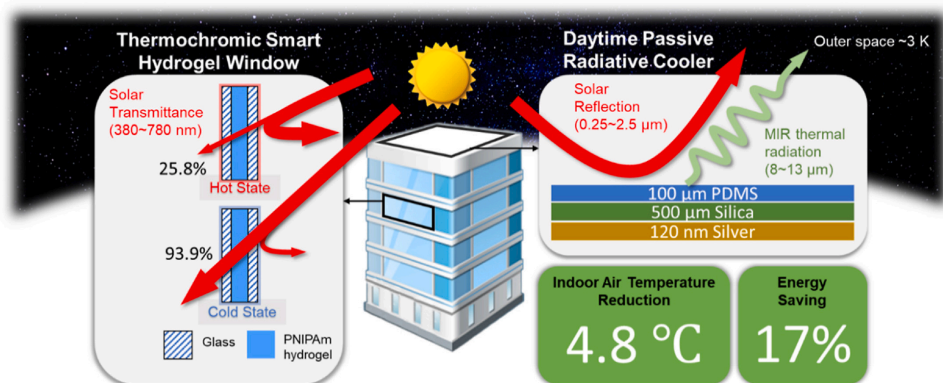


A Composite Material and a Method of Fabrication the Same

Energy & Environment

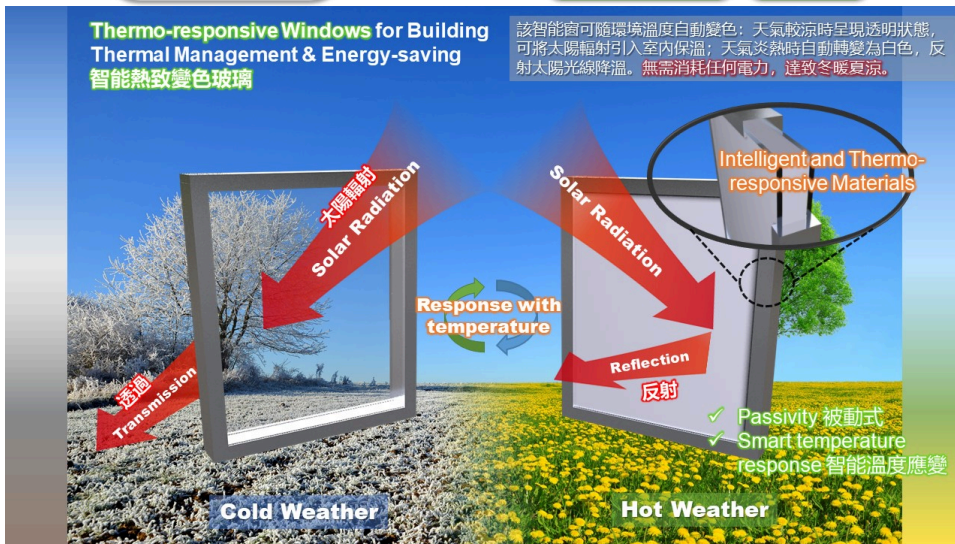
Buildings and Construction Technology

Energy Conservation/Generation/Management/Storage (Battery)



Remarks
Invention Geneva Evaluation Days (IGED) 2022 - Gold Medal

IP Status
Patent filed



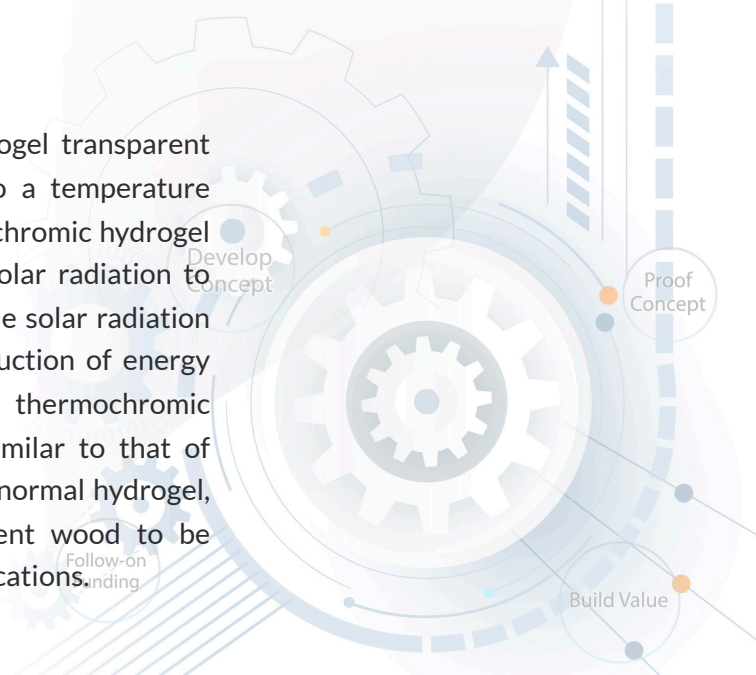
Technology Readiness Level (TRL) ?

4

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Opportunity

The present invention pertains to a thermochromic hydrogel transparent wood with variable optical transmittance in response to a temperature change, and a method of fabricating the same. The thermochromic hydrogel transparent wood is transparent at cold state, allowing solar radiation to pass through, and become opaque at hot state, blocking the solar radiation from passing therethrough. Thus, it may assist in the reduction of energy consumption by HVAC systems. In addition, the thermochromic hydrogel transparent wood has a mechanical strength similar to that of original (native) wood and it is much stronger than that of normal hydrogel, which may allow the thermochromic hydrogel transparent wood to be applied in various building and biomedical engineering applications.



Technology

Smart windows nowadays are built of glass, which has all of the disadvantages of classic silicate or soda lime glass, such as being heavy, brittle, having a high thermal conductivity, and being non-sustainable. Wood, on the other hand, is a renewable and long-lasting building material with excellent mechanical qualities, moderate heat conductivity, and low density. It can even become transparent after a series of chemical treatments. The present invention is related to a thermochromic hydrogel transparent wood towards application of windows and its fabrication method. The thermochromic transparent wood of the present invention may block solar radiation when the ambient temperature is high, while allowing the solar radiation to pass through so as to maintain a warm indoor environment when the temperature is low, thereby reducing the energy needed for indoor heating and cooling.

Advantages

- The thermochromic transparent wood is both lightweight and environmentally friendly. It also has high optical transmittance for daylight harvesting, strong solar modulation ability to manage indoor temperature, low thermal conductivity to insulate heat flow, amazing mechanical strength, and high ductility to eliminate safety problems.

Applications

- Smart windows in buildings: thermochromic hydrogel transparent wood can intelligently regulate the indoor thermal and light environment according to different ambient temperatures.
- Building decoration materials: thermochromic hydrogel transparent wood can automatically change color at different temperatures, and its flexibility allows easy design as different aesthetic pattern in building decoration area.
- Thermal sensitive element: thermochromic hydrogel transparent wood has a stronger mechanical strength than normal thermochromic hydrogel, and it is in a solid state, eliminating the liquid leakage problem of traditional hydrogel, allowing a wider application potential in heat-sensitive materials.
- Biomaterials: thermochromic hydrogel transparent wood can also be applied as electronic skin, drug delivery tools or biosensors because it is heat-sensitive and possesses high-strength properties.

