SCALABLE TEMPERATURE ADAPTIVE RADIATIVE COATING WITH OPTIMIZED SOLAR ABSORPTION

Tech ID: 32994 / UC Case 2023-054-0

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OTHER INFORMATION

CATEGORIZED AS

» **Optics and Photonics**

» All Optics and Photonics

» **Energy**

» Other

» **Environment**

» Other

» **Engineering**

» Other

» **Materials & Chemicals**

» Other

» Thin Films

RELATED CASES

2023-054-0

PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Reference for National Filings	WO 2024/123893	06/13/2024	2023-054

Patent Pending

BRIEF DESCRIPTION

For decades, researchers have been developing “cool roof” materials to cool buildings and save on energy usage from air conditioning. Cool roof materials are engineered to maximize infrared thermal emission, allowing heat to be effectively radiated into outer space and the building to cool down. Conventional cool roof materials emit heat even when it is cold outside, which exacerbates space heating costs and can outweigh energy-saving benefits. A temperature adaptive radiative coating (TARC) material was developed in 2021 that adapts its thermal emittance to ambient temperatures using metal-insulator transitions in vanadium oxide. TARC is projected to outperform existing roof materials in most climate areas, but the complicated structure required high-cost fabrication techniques such as photolithography, pulsed laser deposition, and XeF2 etching, which are not scalable.

To address this problem, UC Berkeley researchers have developed a new scalable temperature-adaptive radiative coating (STARC). STARC has the same thermal emittance switching capability as TARC, allowing the thermal emittance to be switched between high- and low-emittance states at a preset temperature. However, STARC can be produced using high-throughput, roll-to-roll methods and low-cost materials. The STARC material also has an improved lifetime. As an added benefit, while cool roof materials are often engineered with uniformly low solar-absorption, the color and solar absorption of STARC can be tuned for aesthetic purposes or to meet local climate-specific needs.

SUGGESTED USES

- Roof or wall coating to reduce energy consumption by HVAC systems
- Any systems with sky-facing surfaces, e.g., tents, vehicles, satellites, space suits, greenhouses, or electronics, benefiting from passive thermal regulation

ADVANTAGES

- Temperature-adaptive for year-round net energy saving in buildings
- Roll-to-roll printed and mechanically flexible, with long lifetimes
- Tunable color / solar-absorption

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Materials Platform for Flexible Emissivity Engineering
- Surface Sensitization For High-Resolution Thermal Imaging

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