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Low-emissivity colored paints with conductive polymers for year-round energy-efficient buildings

Colorful low-e paints (ε≈0.19) that reduce HVAC loads year-round while preserving architectural aesthetics.

Researchers at Purdue University have developed colorful, bilayer paints that reduce radiative heat transfer between building walls and their surroundings. Existing low-emissivity (low-e) paints maintain indoor temperature but have a metallic appearance that has hindered their adoption. The Purdue low-e paint contributes to thermal stabilization by minimizing heat transfer between the interior of a building and its external environment while maintaining aesthetic appeal. This paint can be made to selectively reflect different wavelengths of visible light, allowing it to appear in a wide range of colors. It can be sprayed or brushed on to a variety of surfaces, making it incredibly versatile and useful in many different scenarios, including building envelopes and cold chain transportation. With its low-e properties, this innovative paint contributes to more energy-efficient building practices, particularly in high-density urban areas.

Technology Validation:

A very low thermal emissivity of 0.19 over 5 Âµm to 20 Âµm wavelength range was achieved, much lower than the 0.95 emissivity of commercial paints. It is predicted that, in the case of a typical midrise apartment building in Seattle, the HVAC system could save up to 30 GJ annually, representing potential cost savings of thousands of dollars per year.

Advantages:

-Low emissivity

-Reduces heat transfer, improving energy efficiency

-Wide range of color options

-Multiple application options

Technology ID

2024-RUAN-70662

Category

Chemicals & Advanced Materials/Polymer Science & Smart Materials

Chemicals & Advanced Materials/Coatings, Adhesives & Sealants

Buildings, Infrastructure, & Construction/HVAC & Building Energy Efficiency

Further information

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-Appropriate for multiple surface types

-May reduce energy demands in dense urban areas

Applications:

-Paint applications where low heat transfer is desired, such as:

-Energy-efficient buildings

-Envelopes

-Cold chain transportation

Publications:

High-Performance Low-Emissivity Paints Enabled by N-Doped Poly(benzodifurandione) (n-PBDF) for Energy-Efficient Buildings. Advanced Functional Materials. https://doi.org/10.1002/adfm.202419685

TRL: 3

Intellectual Property:

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