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Radiative Cooling Paint

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Why in News?

Researchers at the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) Bengaluru, an autonomous institute of the Department of Science and Technology, have introduced an innovative paint that utilizes radiative cooling.

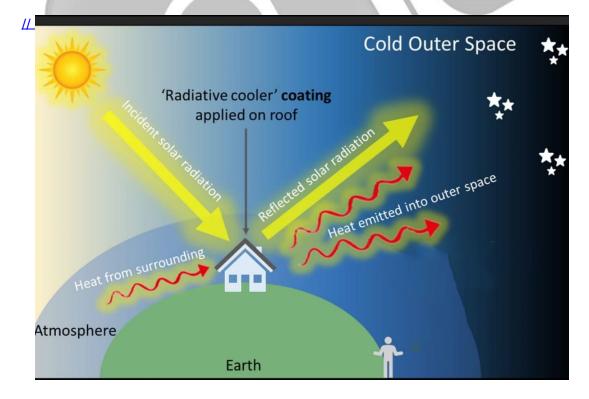
 In the wake of escalating global temperatures and the pressing need for sustainable cooling solutions, this new, cost-effective, and eco-friendly radiative cooling technology stands as an effective solution.

What is Radiative Cooling Technology?

- About:
 - Radiative cooling technology is a method designed to dissipate heat from an object by emitting thermal radiation into the atmosphere, allowing the object to become cooler.

Vision

- It leads to creation of cool surfaces by emitting <u>thermal radiation</u> directly into the extremely cold universe (around 3 Kelvin), using the atmospheric transmission window (8 13 μm).
 - Notably, this process occurs without any reliance on electricity.



- Need:
 - Increased <u>global warming</u> **and** <u>urban heat island effects</u> have accentuated the necessity for effective cooling technologies.
 - Conventional active cooling devices like <u>air-conditioners</u>, fans, and refrigerators demand substantial electrical energy, contributing to greenhouse gas emissions and elevated surface temperatures.
 - Radiative cooling technology addresses these challenges by emitting thermal radiation without electricity consumption, through the atmospheric transmission window.

Radiative Cooling Paint:

- It is derived from a novel magnesium oxide (MgO)-polyvinylidene fluoride (PVDF) polymer nanocomposite prepared from materials that are earth abundant, cheap, nontoxic and non-harmful.
 - It showcases remarkable cooling capabilities with high solar reflectivity and infrared thermal emissivity.
 - The MgO-PVDF with dielectric nanoparticles resulted in high solar reflectance (96.3%) and exceptional thermal emission (98.5%).
- Tailored to counter **escalating heat impact on buildings**, this paint minimizes electricity usage and provides **crucial cooling during sweltering summer days**.
 - With outstanding optical features, **it lowers surface temperatures by about 10°C** in strong sunlight, outperforming standard white paints.
- Its water-resistant, hydrophobic nature guarantees effortless application on diverse surfaces, ensuring consistent coverage and strong adhesion.

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