

Cooling system from MIT uses an evaporation–insulation cooling design that eliminates power usage.

Benefits

- Sustainable
- Reduced energy usage
- Reduced waste

Applications

- Pharmaceuticals
- Food storage
- HVAC systems

UN Sustainable Development Goals Addressed



Goal 3: Good Health & Wellbeing



Goal 11: Sustainable Cities & Communities



Goal 12: Responsible Production & Consumption

The Challenge

Biological samples and food products are often stored in refrigeration, which makes them vulnerable to equipment malfunction and oftentimes leads to decomposition over time. In addition, shipping these items in a refrigerated vessel or on dry ice can be costly and uses excessive materials.

Innovation Details

The cooling system is made of two layers. The inner layer is made of a hydrogel, from which water can readily evaporate, similar to sweat glands. The outer layer is an aerogel, which keeps out external heat, but allows the water vapor to pass through, similar to camel fur. The water vapor has a cooling effect as it increases the time it takes for the warm ambient temperature to reach the contents within the cooling system. The system is set-up so that the hydrogel can be easily rehydrated. The entire material is less than a half-inch thick and can provide cooling of more than 7 degrees Celsius for five times longer than just the hydrogel alone.

Biomimicry Story

Camels have a thick layer of insulating fur that reduces the amount moisture lost to the desert heat, which protects them from dehydration.

References

JOURNAL ARTICLE

Passive Sub-Ambient Cooling from a Transparent Evaporation-Insulation Bilayer

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