

## Passive Radiative Thermostat (PRT)

### Value Proposition

Passive Radiative Thermostat is an electricity-free coating that passively regulates temperature by cooling in heat and warming in cold, with applications across buildings, vehicles and outdoor equipment.

### Technology Readiness Level 2

### IP Information

U.S. Patent No. 11,359,839

### Contact Information

[licensing@lanl.gov](mailto:licensing@lanl.gov)

Reference S-133670 when reaching out.

### Overview

The Passive Radiative Thermostat (PRT) is a smart, electricity-free coating technology that automatically regulates temperature by adjusting how it absorbs and emits heat based on ambient conditions. Using a thermochromic phase-change material combined with engineered thin-film layers that control solar and infrared radiation, the system cools surfaces on hot days by reflecting sunlight and releasing heat to the sky and warms them on cold days by absorbing sunlight and minimizing heat loss — all without sensors, controls or power input. Designed for integration into roofs, facades, windows, vehicles and outdoor equipment, the technology offers a scalable, low-maintenance pathway to reduce HVAC energy consumption, lower peak electrical loads, improve thermal comfort and support decarbonization goals across building, mobility and industrial markets.



Adobe Stock photo for illustration purposes only

### Advantages

- Automatic temperature regulation
- No power required
- Year-round performance
- Energy savings potential
- Thin-film compatibility
- Scalable and low maintenance

### Technology Description

Passive Radiative Thermostat is a temperature-responsive surface coating that automatically adjusts how it manages heat based on surrounding conditions. PRT incorporates a material that naturally changes its thermal behavior at a preset temperature, allowing the surface to release excess heat when it is hot and retain warmth when it is cold. By intelligently interacting with sunlight and infrared heat, the system stabilizes surface temperature without requiring electricity, sensors or moving parts. The result is a passive, self-regulating thermal control approach that improves temperature management.

<https://doi.org/10.1088/2515-7647/adc9eb>

### Market Applications

- **Building & Construction**
- **Automotive & Transportation**
- **Energy & Utilities**
- **Industrial & Manufacturing**
- **Data Centers & Telecommunications**
- **Consumer & Outdoor Products**