

UmiCool: 環保智能亞環境輻射致冷 (SSRC) 塗料

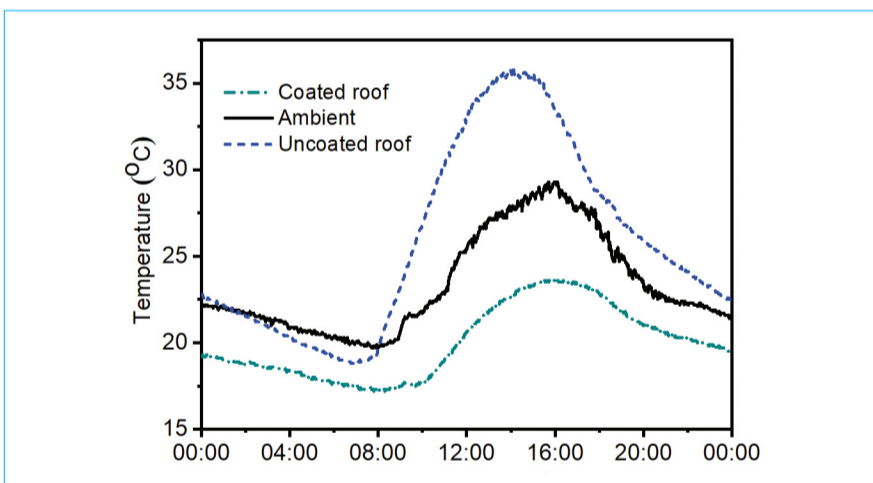
UmiCool: an Eco-friendly Smart Sub-ambient Radiative Cooling (SSRC) Coating

令建築物室內溫度低於環境溫度的不耗電方法
Making interior temperature in buildings cooler than ambient temperature without using electricity

理大研究團隊研發的UmiCool是一種環保、具自清潔功能、效用持久而低成本的亞環境輻射致冷塗層。該塗層在夏季可為建築物降溫而無需消耗電力。通過結合粒子散射、熒光發射和中紅外寬帶輻射，UmiCool可以散射太陽光，將被吸收的紫外線轉化為熒光發射，並通過紅外輻射的方式將物體表面的熱能釋放到寒冷的太空，實現白天增強但夜間抑制的致冷效果。該塗層可減輕空調的電力需求及其對環境的影響，廣泛應用有助緩解全球暖化和城市熱島效應。



UmiCool環保智能亞環境輻射致冷 (SSRC) 塗料
UmiCool: an Eco-friendly Smart Sub-ambient Radiative Cooling (SSRC) Coating



模型房的屋頂溫差比較
Comparison of temperature difference on the roof of model rooms

UmiCool developed by PolyU researchers is an eco-friendly, self-cleaning, durable and cost-effective smart sub-ambient radiative cooling (SSRC) coating. The coating cools buildings under direct sunlight in summer without the use of electricity. The sub-ambient cooling effect is enhanced during daytime but suppressed during nighttime. Through combining particle scattering, sunlight-excited fluorescence, and mid-infrared broadband radiation, the coating can scatter sunlight, convert absorbed UV light to fluorescence emissions and re-emit infrared radiation to the cold universe. It provides an attractive solution to alleviate the power demands as well as negative environmental impact of building air-conditioning cooling. Its wider application can help mitigate global warming and urban heat island effect.

Principal Investigator

Prof. Jianguo Dai
Department of Civil and Environmental Engineering

Contact Details

Knowledge Transfer and Entrepreneurship Office
Tel: (852) 3400 2929 Email: info.kteo@polyu.edu.hk

專利申請編號: PCT/CN2020/124665, 62/927,756 美國

特色與優點

此獨特的單層日間輻射冷卻塗層可將熱量經地球的大氣窗口傳輸到外太空。它具有寬譜發射、多層粒子散射和PURCELL效應增強熒光發射特性，且以常用建築物料製造，強度良好，能夠承受長期的風化作用。

應用

- 屋頂、牆體等建築圍護結構、現場辦公室、展廳
- 工廠、倉庫、油庫、機場廊橋、行人路

獎項

- 瑞士日內瓦國際發明展 - 2022年網上特別版 - 金獎 (2022年3月)
- 第7屆「創青春」粵港澳大灣區青年創新創業大賽-優勝獎 (2021)
- 第7屆香港大學生創新及創業大賽 - 二等獎 (2021)



模型房驗證測試
Model room testbed validation

Patent Application No.: PCT/CN2020/124665, 62/927,756 (US)

Special Features and Advantages

A unique single-layer daytime radiative cooling coating allowing heat to be transmitted into outer space through Earth's atmospheric window, the coating has broadband emissivity-induced smart cooling, multiple-layer particle scattering and Purcell effect-enhanced fluorescent emission. Common construction materials are used in the coating, making it strong enough to withstand long-term weathering.

Applications

- Building envelope such as roof and wall, in-situ office room, exhibition hall
- Industry factory, storehouse, oil tank, airport covered bridge, pavement

Awards

- Gold Medal - Special Edition 2022 Inventions Geneva Evaluation Days - Virtual Event (Mar 2022)
- The 7th Guangdong-Hong Kong-Macau Greater Bay Area Youth Innovation & Entrepreneurship Competition
- The 7th Hong Kong University Student Innovation and Entrepreneurship Competition (Entrepreneurship, Second Prize)

Access More info via mobile



Source: Subject to data change. For detailed information