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Supervisor: Dr. Edwin TSO

Building Energy-saving

HK  
TECH  
300



High Thermal  
Emission

High Solar  
Reflection

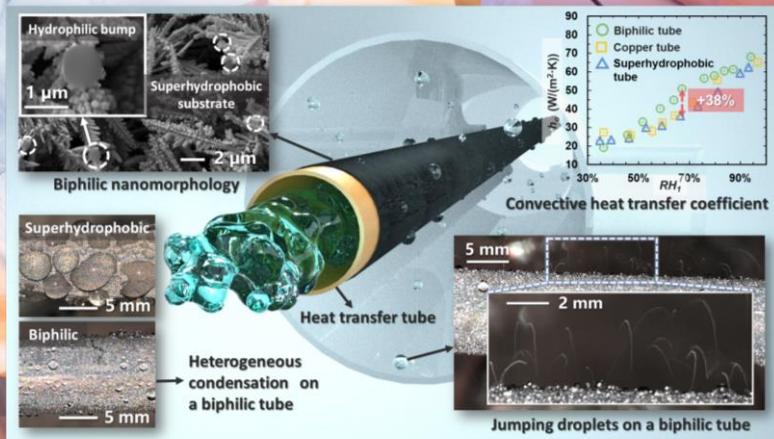
Electricity-free  
Cooler



Morning

Noon

March, 2022





# Air-Conditioned World



**2 Trillion kWh / 1135 Mt CO<sub>2</sub>**

Annual Electricity Consumption /  
Emission for Cooling in Buildings [1]



**11 Billion kWh / 6490 Kt CO<sub>2</sub>**

Annual Electricity Consumption /  
Emission for Cooling in Buildings [2-3]



**US\$ 800 Billion**

Global Serviceable Market



**HK\$ 3 Billion**

Short-term Serviceable Market

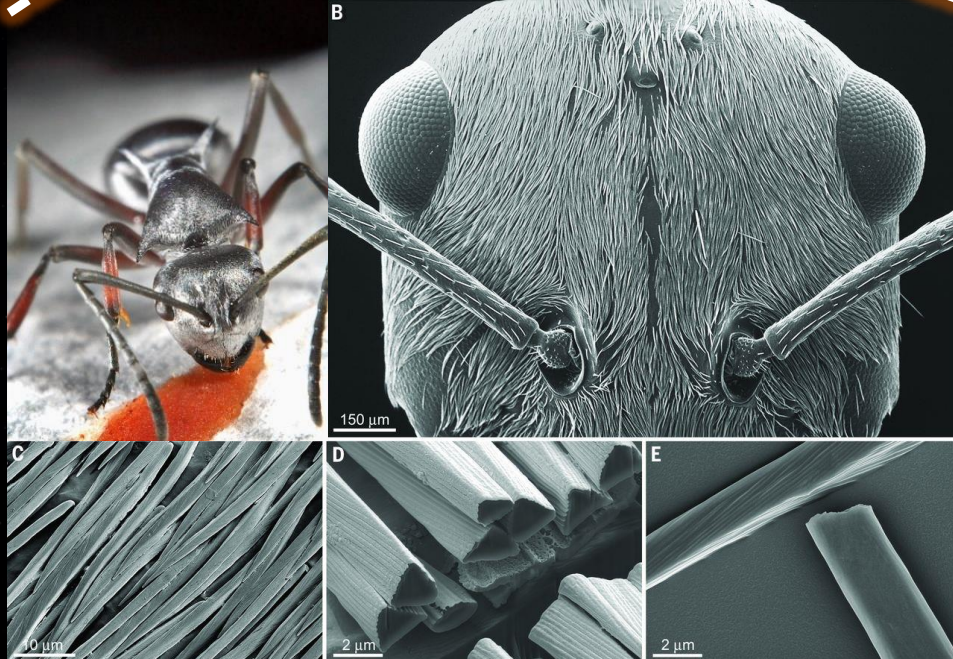
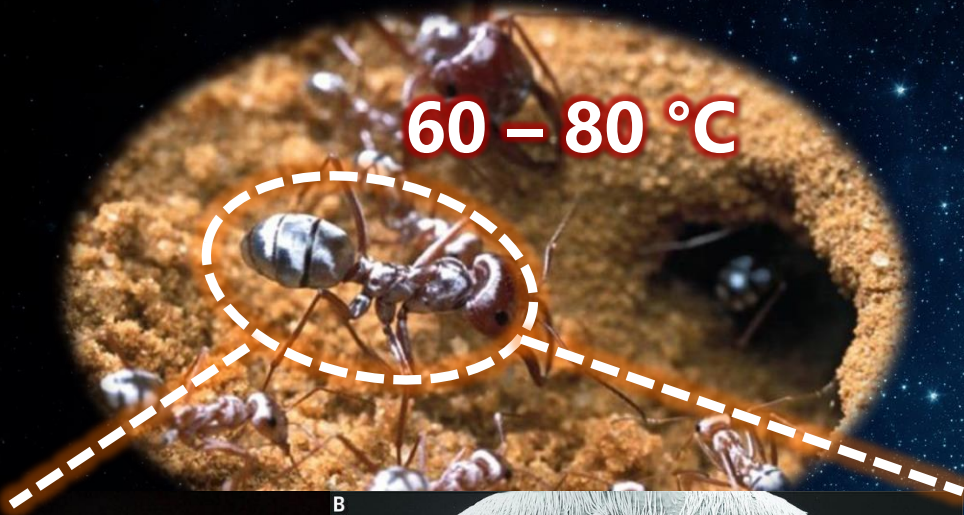
[1] Birol, F. (2018). *The future of cooling: opportunities for energy-efficient air conditioning*. International Energy Agency.

[2] Hong Kong Energy End-use Data 2021

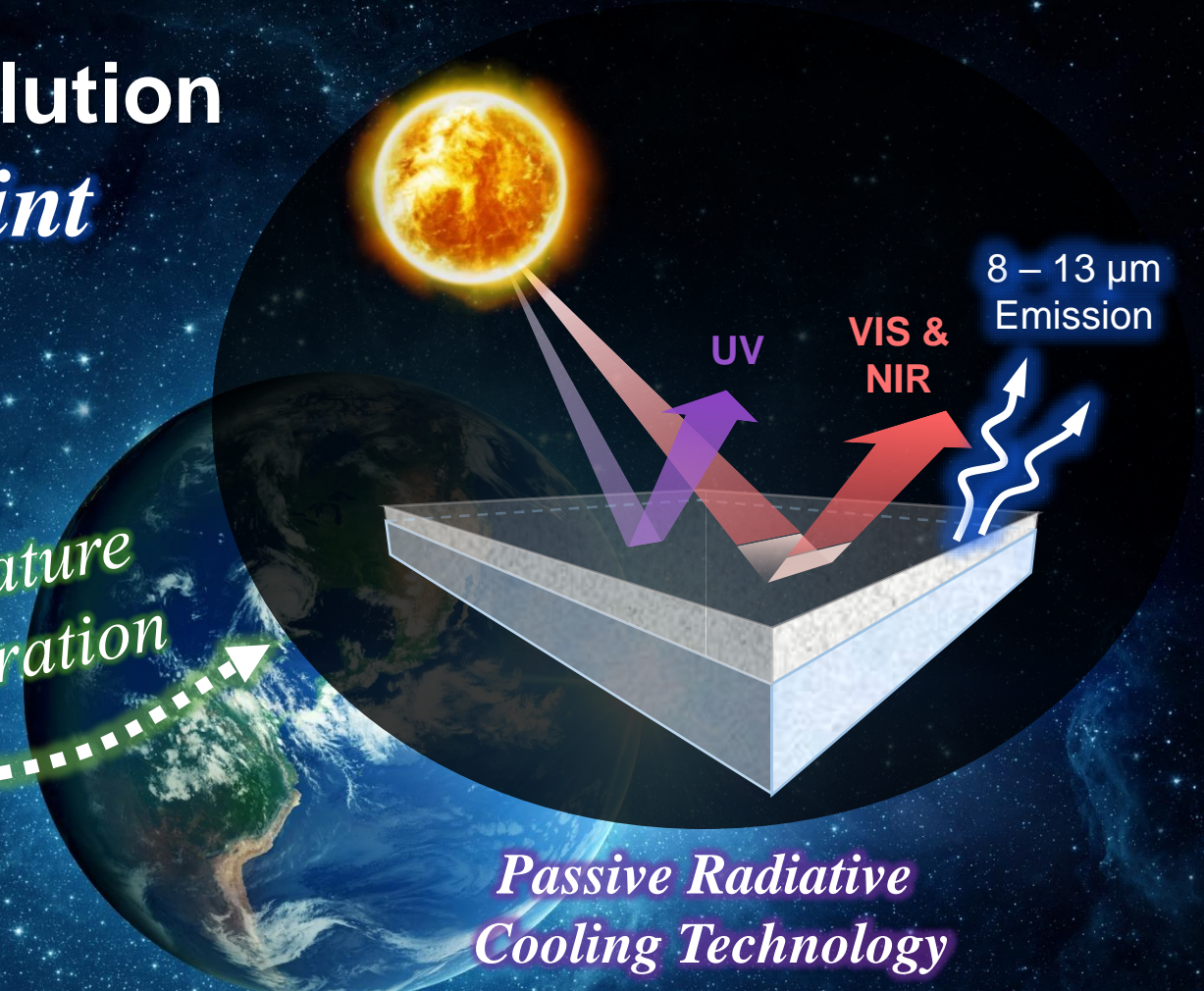
[3] Statistical highlights of environmental affairs (ISSH20/19-20, 2 March 2020), Research Office, Information Services, Division Legislative Council Secretariat



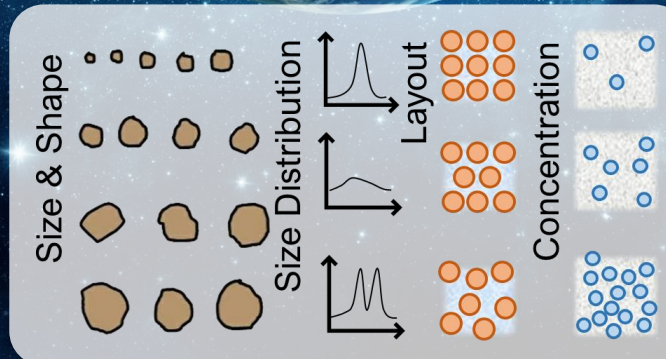
# Our Solution *iPaint*



Nature  
Inspiration



*Passive Radiative  
Cooling Technology*



Patents:

- ✓ HK30045313
- ✓ HKS01056
- ✓ GAI21CN6459

Shi, Norman Nan, et al. *Science* 349.6245 (2015): 298-301.





**Saving 90**  
kWh / (m<sup>2</sup>·year)



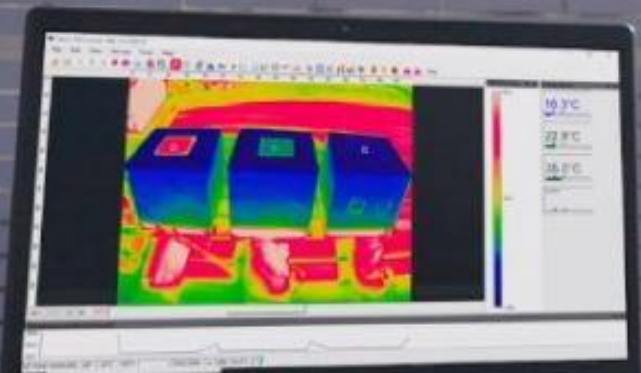
**Reducing 50**  
kg CO<sub>2</sub> / (m<sup>2</sup>·year)



**1.7 Years**  
Expected Payback  
Period of *iPaint*



**> 5 Years**  
Estimated Life  
Span of *iPaint*



34.9°C

No  
Paint

22.9°C

Normal  
Paint

15.0°C

Passive Radiative  
Cooling Paint



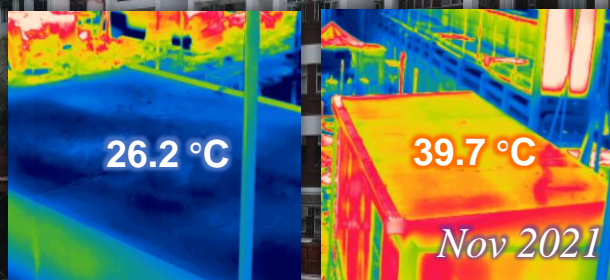
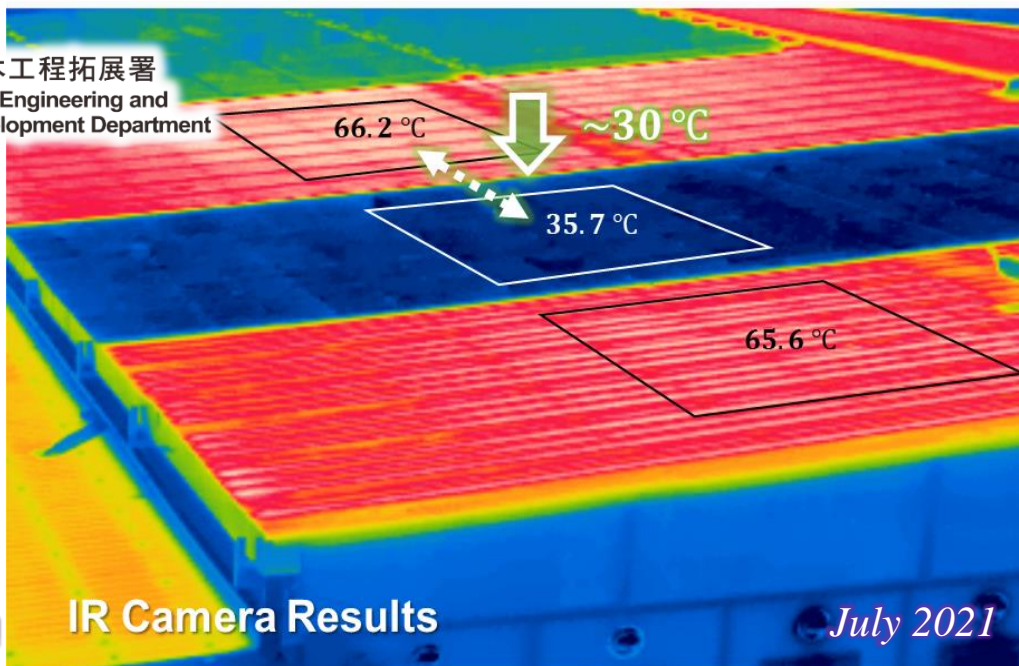
Thanks to our unique and patented material composition,  
Grâce à notre composition unique et brevetée des matériaux,



機電工程署  
EMSD



土木工程拓展署  
Civil Engineering and  
Development Department



With iPaint

Without Coating

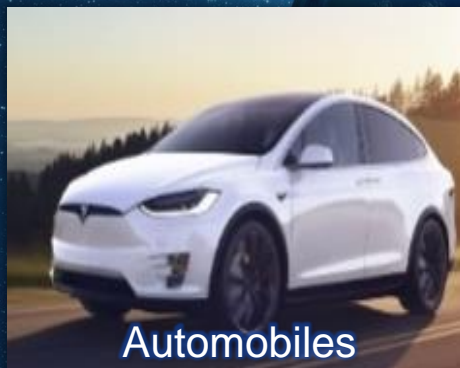


@Mong Kok





# Where there is Sunlight, there is





Santorini, Greece

*iPaint 2*

White vs Colors

Cooling Performance vs Aesthetics

Doping with color pigments

顏色色素

Solar Reflection: decreased by ~5-10%

# Cooling Textiles

*iTextile*

Cold Universe (~ -270 °C)

Human body radiation

Atmospheric window

Solar Radiation (VIS & NIR)

Solar radiation

Metabolic heat

Convection

Conduction

Evaporation

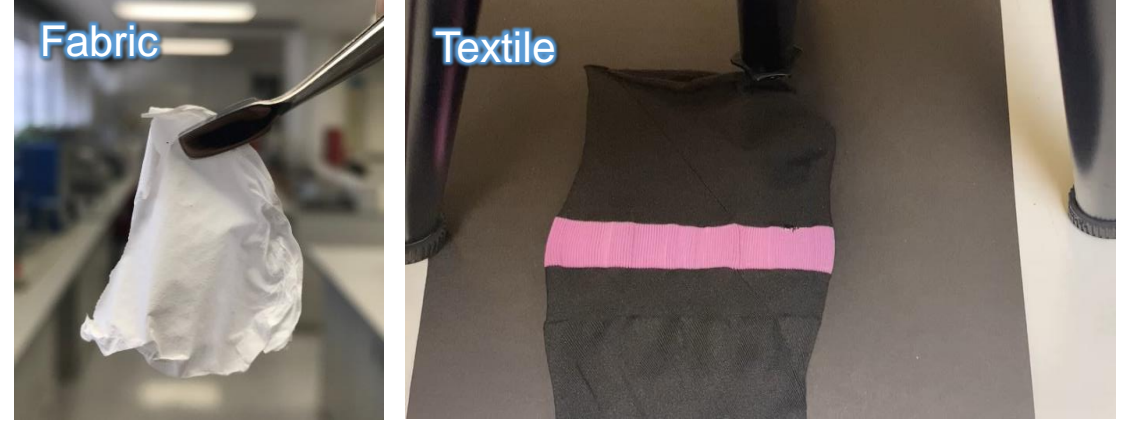
Thermal radiation

RC Textile

skin

$\pi$  創新科技署

Innovation and Technology Commission



*iCeramic*

Radiative Cooling Ceramic

> 150° 超疏水

20  $\mu\text{m}$

Reflectivity @ 0.25~2.5  $\mu\text{m}$ : 99.6%

Emissivity @ 8~13  $\mu\text{m}$ : 95%

Solar Spectrum

Atmospheric Transmittance

*iPaint 3*

四季溫差大

Summer 35 °C

Winter 1~2 °C

Cold State

Hot State

5 cm

Cooling Power Control

Reflectivity (%)

Solar Irradiation ( $\text{W}/\text{m}^2$ )

Wavelength ( $\mu\text{m}$ )

$R_{\text{hot}} = 94\%$

$R_{\text{cold}} = 79\%$

Hot State

Cold State

Water Proof Testing 防水測試

Temperature (°C)

Solar Intensity ( $\text{kW}/\text{m}^2$ )

Time (HH:MM)

135  $\text{W}/\text{m}^2$

143  $\text{W}/\text{m}^2$

4 °C

6 °C



# Extending our Leads

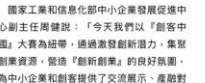
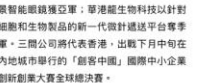
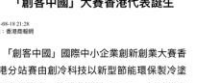
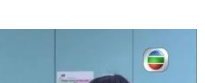
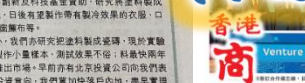
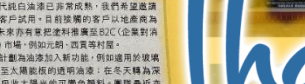
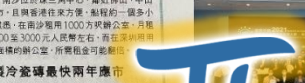
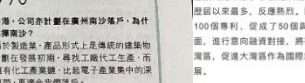
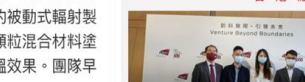
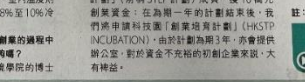
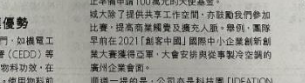
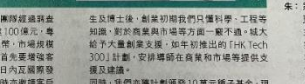
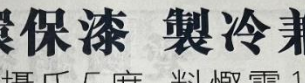
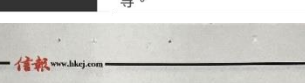
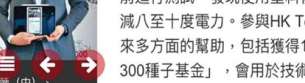
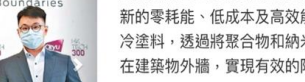
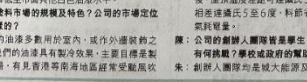
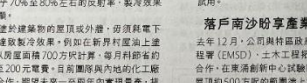
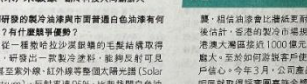
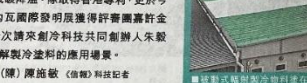
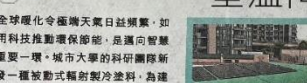
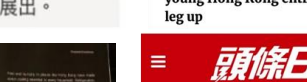
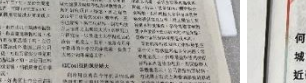
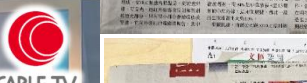
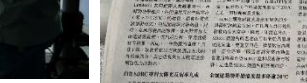








# To the Goal of Carbon Neutrality







HK  
TECH  
300



Thank You Q&A

YouTube  
i2Cool

@i2coolhk

i2Cool  
Limited



More INFO:  
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