



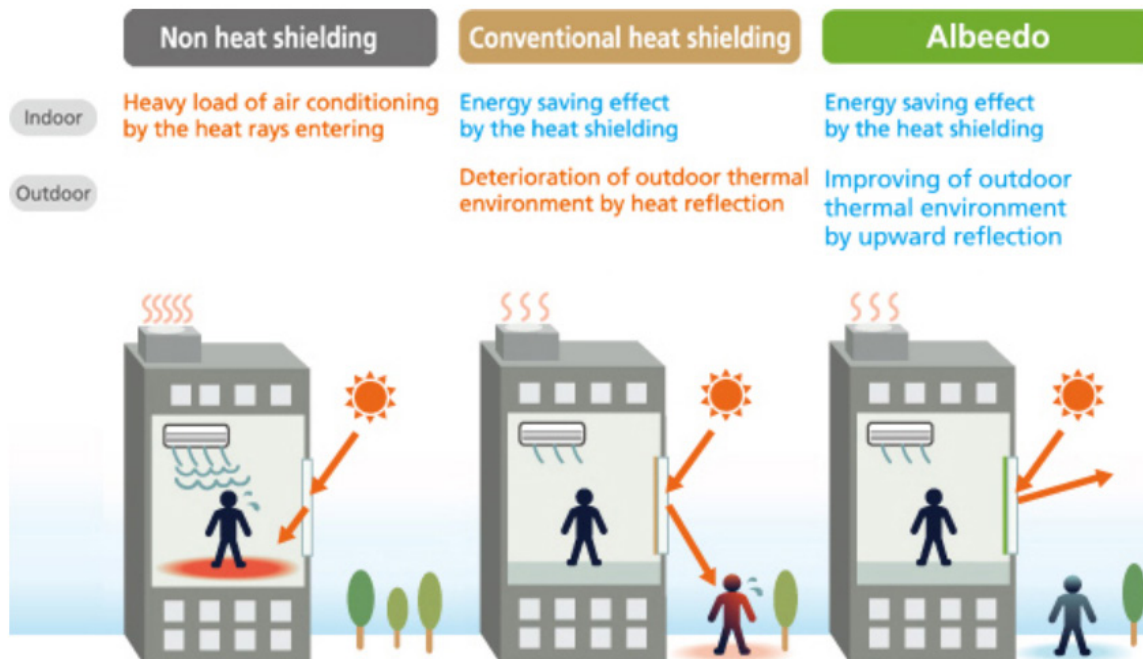
Question 1 – Where are we?

The commitment (planned and/or announced) as well as the actions taken so far that are in line with aims of Paris Agreement, the 1.5/2 degrees' goal and the transition towards a net-zero emission society by this mid-century

Under our corporate vision, "Value matters Unprecedented innovation, unprecedented value," Dexerials develops businesses that lead to new value aiming to contribute to enhancing the quality and richness of both people's life and our environment through creating products that help conserve the global environment. In our environmental business, with the objective of lessening environmental impact, we develop and launch products that strive to reduce the amount of produced sludge with water treatment agents that takes advantage of natural plant raw materials, and to reduce the rises in temperature of urban surfaces by solar retro-reflective technology to which a micro structure/optical designing technique has been applied.

Focusing on the fact that solar radiation worsens both indoor and outdoor thermal environments in cities, we have developed solar retro-reflective technology that has an added spectrally selective function that can improve indoor comfort by reducing solar heat gains while taking the outdoor environment into consideration. We furthermore have commercialized it into an architectural solar control window film product.

The solar control window film selectively reflects near-infrared (certain spectral regions of solar radiation) back to the sky, reducing solar heat gain to keep indoor temperatures low. The reflected near-infrared is directed upwards and thus not absorbed by urban surfaces, which enables the improvement of indoor comfort while at the same time taking outdoor environment into consideration (by preventing rises in urban surface temperatures).



<http://www.dexerials.jp/en/products/a6/iravk700.html>



Figure 1 Conceptual diagram of improvement of indoor energy efficiency and outdoor thermal environment

【Progress made so far】

- We have developed and commercialized an architectural solar control window film that retro-reflects near-infrared.
- We improved the recognition of our solar retro-reflective technology to stakeholders and promoted its spread.
- We verified and proved its effects in a collaborative effort with universities, government ministries and agencies, and other institutes.
- We promoted the adoption of the technology in guidelines for urban development or environmental guidelines by local governments.

[Environmental Rating System]

Solar retro-reflective technology became eligible to earn a point. (CASBEE-HI 2017)*

(* Ref.: Website of Ministry of Land, Infrastructure, Transportation and Tourism

http://www.mlit.go.jp/sogoseisaku/environment/sosei_environment_mn_000024.html)

[Verification]

"Albedo IRAVK700" 2017 Environmental Technology Verification (ETV) Program by MOE (No. 051-1703)

"Albedo IRA2J700" 2015 Environmental Technology Verification (ETV) Program by MOE (No. 051-1506)

[Certification]

"Solar retro-reflective window film" (2016 Osaka HITEC Applicable technology in certification program as Urban Heat Island Mitigation Technology)

[Listed in Guidelines]

Retro-reflective technology for vertical surfaces has been listed on p.23 of the Guideline of Countermeasures for Urban Heat from the Ministry of the Environment

Retro-reflective technology has been listed as an example of efforts for adaptation (A-PLAT Ministry of the Environment)

Retro-reflective technology has been listed as a countermeasure (Guide to Measures against Summer Heat from the Tokyo Metropolitan Government)

[Grant program] Had a track record eligible for Grant (Grant for "Cool Spot" Tokyo Metropolitan Government)

Listed as applicable technology (Grant for "Cool Spot Model" Osaka Prefectural government)

[Award]

Solar Control Window Film Albedo received a Technology Award from Heat Island Institute International 2017

[Academic papers by multiple authors including Dexerials]

"Improvement of urban thermal environment by wavelength-selective retro-reflective film" Takashi INOUE^a, Taizo SHIMO^a, Masayuki ICHINOSE^b, Kazo TAKASE^a, Tsutomu NAGAHAMA^c (Energy Procedia Volume 122, September 2017, Pages 967-972) "Effect of retro-reflecting transparent window on anthropogenic urban heat balance" Masayuki ICHINOSE^b, Takashi INOUE^a, Tsutomu NAGAHAMA^c (Energy and Buildings Volume 157, 15 December 2017, Pages 157-165)

a. Tokyo University of Science

b. Tokyo Metropolitan University

c. Dexerials Corporation

[Other academic papers relevant to our efforts]



"Evaluation of effects of windows installed with near-infrared rays retro-reflective film on thermal environment in outdoor spaces using CFD analysis coupled with radiant computation" Shinji YOSHIDA, Akashi MOCHIDA (Building Simulation (2018)) and Nara Women's University and Tohoku University etc.

Question 2 - Where do we want to go?

Vision of the future for your organization and/or sector in terms of its possible role in achieving the 1.5/2 degrees' goal and a net-zero emission world by this mid-century

Improving indoor energy efficiency by conventional reflective technology that reduces heat gain as an effort to address decarbonization increases as a result thereof the amount of solar radiation reflected onto urban surfaces. We see it as a challenge. In addition, we are concerned that urban surface temperatures will rise more than ever due to the progress of urbanization, coupled with an increasing number of buildings with large glass windows. Decarbonization aiming for lower CO₂ emissions is the primary countermeasure against global warming. Therefore, applying this technology to the vertical surfaces of buildings, wall and windows to reduce solar radiation striking urban surfaces by reflecting it back into the sky can be a completely new concept in terms of anti-global warming countermeasures in the sense that it decreases the source of heat energy itself before it turns into heat. We will contribute to reducing rises in the temperature of urban surfaces by putting the technology to practical use for the vertical surfaces of buildings, for which proper measures have not been sufficiently taken so far.

Possible and potential new commitments and pledges of to achieve the 1.5/2 degrees' goal and a net-zero emission world by this mid-century

We will promote the significance of adopting solar retro-reflective technology in buildings, encouraging manufacturers of glass or walls, and other building materials, central and local governments, and building owners to understand the importance of buildings' vertical surfaces, and to think about the global benefits together.

1. Collaboration with environmental agencies in central and local government and universities to implement verification (ETV by MOE, etc.)
2. Building a track record in collaboration with local governments.
3. Increasing recognition of the technology, and developing certification and standards for promoting dissemination (incorporated into CASBEE, LEED, JIS, etc.)

Foreseen positive impact of these commitments once they are realized, including contributions to the sustainable development agenda

Solar retro-reflective technology is able to realize the following if it is widely adopted for the vertical surfaces of buildings.



- To reduce reflections from the vertical surfaces of buildings, which have a great impact on amount of received solar irradiance.
-To reduce rises in temperature of urban surfaces, which influences the quality of life.
-To mitigate the urban heat island effect.
-Aesthetically designed modern buildings tend to have large glass windows and their vertical surfaces have a great impact on environment. Even in such a case, solar retro-reflective technology reduces the negative impact of reflection, resulting in attaining both good environmental and aesthetic characteristics.
The United Nations reports that continuing the growth of the world's population and urbanization is projected. The increasing number of high-rise buildings in cities and thereby the increasing amount of reflection from vertical surfaces is expected to worsen the thermal environment in cities, which is inevitable due to the simple extension of conventional technologies, leading to more energy consumption. Solar retro-reflective technology can slow down this vicious cycle.

Question 3 - How do we get there?

Concrete solutions that have been realized while implementing your commitments, including lessons learnt from success stories and challenges, and case studies that are in line with the 1.5/2 degrees' goal and can support the Parties in achieving their NDC goals, enable higher ambition and inspire engagement of other non-state actors

The increasing recognition and adoption of the technology in cities not just in Japan but in other countries as well can be expected to have a great effect on reducing rises in the temperature of urban surfaces. We want to accelerate the spread of the innovative technology by encouraging the UN climate change process to understand the concept; namely, reducing the thermal factor itself or amount of solar energy by reflecting it upwards before it is absorbed and turns into heat. Additionally, proactive efforts by the government of Japan in promoting the spread of this innovative technology across borders can realize co-innovation that benefits both parties from Japan and partner countries, which greatly helps bring a global decarbonizing society into reality. Solar retro-reflective technology is a technology that does not compete with others but instead coexists with them, generating significant economic effects. We strongly hope that the UN climate change process and the government of Japan support this innovative technology by taking administrative measures to spearhead its spread internationally. Adopting solar retro-reflective technology for newly built buildings can help slow down global warming. We are now working on developing a glass product into which solar retro-reflective technology is integrated for easier installation on new buildings, while promoting the spread of the technology incorporated into exterior wall materials as well, with regard to which we will continue and accelerate our efforts.