

Eco-friendly Products and Technology

–Changing the World with the Power of Paints–

Mitigating the heat island phenomenon through the power of high-reflectance paint

Controlling rises in temperature with improved reflectance

Rises in temperature during the summer due to the heat island phenomenon are a serious social issue, especially in metropolitan areas, and recently a variety of countermeasures have been studied.

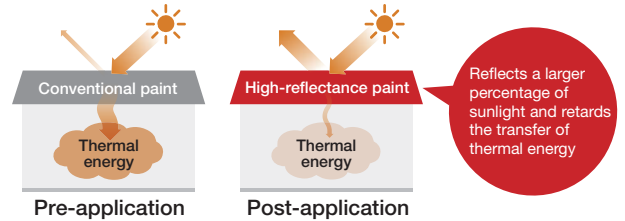
Sunlight, especially infrared radiation, contains thermal energy. Thermal energy is transferred to objects when they are exposed to infrared radiation, and this raises their temperature. This is one of the biggest factors behind the heat island phenomenon.

Nippon Paint Group has developed high reflectance paints that reflect sunlight extremely well. In 1999, the Nippon Paint Group was the first to sell what are now commonly called high-reflectance paints for use on the roofs of factories and warehouses.

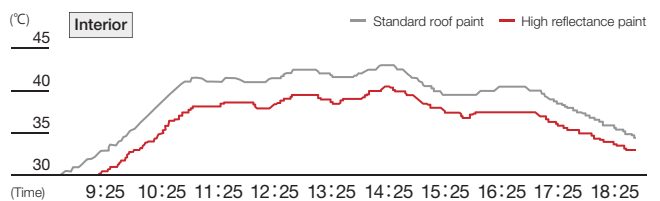
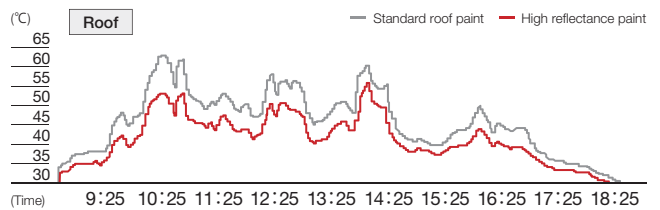
Since that time, we have launched a number of other products for use on road surfaces, marine vessels, and railway cars. In 2008, we repainted the entirety of the Takahama plant operated by what is now Nippon Paint Automotive Coatings Co., Ltd. (NPAU) with the first eco-friendly paint using high reflectance technology. Our strategy was to use the plant in presentations, and indeed it has contributed to raising awareness of high-reflectance paints and relieving the heat island phenomenon.

In recent years, we have included high-reflectance paints in our lineup for private residences and now produce a broad range of weather-resistant and stain-resistant high-reflectance paints.

Comparison between high-reflectance paint and standard roof paint



Temperature trends by paint type



* Measurement environment: Prefab house at Takahama plant of NPAU (current name), using high-reflectance paint from Nippon Paint Group (July 18, 2009 / High of 31.7°C / Low of 23.9°C)

Launch of the world's first high-reflectance paint for automobiles

Displaying design sense, thermal barrier properties, weather resistance, and stain resistance

Using the high reflectance paint technology cultivated within the group since 1999, we have developed an auto body coating displaying design sense, thermal barrier properties, weather resistance, and stain resistance. The use of Nippon Paint Group high-reflectance paint on automobiles is the world first.



Toyota Prius "Thermo-Tect Lime Green"

Promoting high-reflectance paint for roadway use in time for the Tokyo Olympic Games

Reducing the rise in road surface temperatures and lightening the burden on athletes

Leading up to the 2020 Tokyo Olympics, we are promoting the use of high-reflectance paint on the roadways to be used for the marathon. The road surface in summer can reach 50°C, so using the paint to keep the temperature down would lighten the burden on participating athletes.



Improving the fuel efficiency of marine vessels through the power of biomimetic coatings

Reducing friction drag on the hull improves fuel efficiency

According to an announcement by the International Maritime Organization (IMO), international shipping emits some 800 million tonnes of CO₂, or about 3% of total global emissions. This is roughly equivalent to all the emissions produced by Germany in one year.

Reducing CO₂ emissions is a global issue, and the IMO is requiring all vessels of 5,000 tonnes or more that travel internationally to report operational data including fuel consumption, traveled distance, and traveling time from 2019 onward.

The hulls of marine vessels tend to accumulate barnacles, algae, and other marine life that increase drag on the hull, causing the vessels' fuel efficiency to deteriorate.

Nippon Paint Group has been putting its energy into the development of hydrolysis-type marine vessel antifouling paint, which prevents marine life from adhering to the hull by hydrolyzing the coating film, and in particular has been proceeding with a shift to antifouling agents with less environmental impact. In 1990, we developed the world's first tin-free hydrolysis-type antifouling paint. In 2008, in addition to the antifouling function, taking hints from the skin of tuna and dolphins, we developed "LF-Sea," a low-fuel-consumption antifouling paint that which uses biomimetic technology to further



The Queen Elizabeth coated with A-LF-Sea

reduce drag on vessel hulls. In 2013, we developed "A-LF-Sea," which is even better at improving fuel efficiency.

By developing antifouling paints for marine vessels with an eye on both reducing environmental impact and improving fuel efficiency, Nippon Paint Group contributes to the reduction of global CO₂ emissions.

World first! Biocide-free self-polishing antifouling paint AQUATERRAS

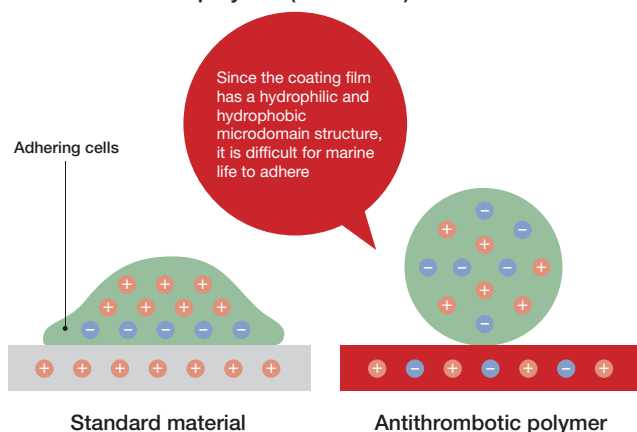
Contributing to long-term antifouling and improved fuel efficiency for marine vessels

Leveraging hydrolyzing resin technology and R&D results accumulated within the group, we developed the world's first hydrolysis-type biocide-free antifouling paint for marine vessels. Using a hydrophilic and hydrophobic microdomain structure suggested by the function of antithrombotic polymer. It prevents marine life from adhering to the hulls of marine vessels and has long-term stain resistance due to the self-polishing effect of the

hydrolysis reaction on the surface of the coating film.

In addition, thanks to the complete absence of antifouling agents, the paint has a much smoother finish than conventional products, reducing friction and improving fuel efficiency. The further development of biocide-free antifouling paint AQUATERRAS, with its decreased burden on the marine environment, will also help to reduce CO₂ emissions.

▼ Hydrophilic and hydrophobic microdomain structure of antithrombotic polymer (illustration)



Yugemaru, training vessel of the National Institute of Technology's Yuge College, after being painted with AQUATERRAS