

Corporate Solutions to Global Environmental Issues

Japanese companies have been receiving worldwide attention for their efforts to develop various environmentally friendly products and technologies. Japan Echo takes a look at the progress being achieved by several companies hard at work in this field.

Fumin

Small Firm, Big Gains

Fumin is a small company employing just three people located in Fukushima Prefecture. Simply spraying a window with Fumin's revolutionary coating provides protection against roughly 90% of ultraviolet rays and 50% of infrared rays. As it allows more than 80% of visible light to pass through, the treatment has no adverse effect on interior illumination. Its low reflectivity of ultraviolet and infrared rays also makes it an effective means of countering the phenomenon of urban "heat islands."

Pursuing Innovation

Fumin was originally a seller of agricultural equipment, but the company president, Katsuo Yagisawa, visited various experts in search of new business opportunities. The idea for Fumin's coating stemmed from a conversation with a semiconductor specialist. "The talk turned to antimony tin oxide [ATO], a liquid used to coat semiconductors to prevent them from retaining heat," he recalls. "When I asked him about it, he said that it's also used as a coating for solar

panels, since it has a high capacity for absorbing infrared and ultraviolet rays.

"I mentioned that it should be possible to use ATO to coat the windows of houses, thereby screening infrared and ultraviolet rays to keep the interiors from getting hot during the summer. The chip specialist merely laughed and said it was impossible. ATO isn't effective unless it's thinly and uniformly applied, he told me, so in the case of electronic parts, ATO coating is applied using a process called vacuum deposition. Windows, he said, were too large for this process, and simply painting the ATO onto a window wouldn't be enough to achieve a sufficiently even application."

Yagisawa learned that several companies were already at work on finding a way to apply ATO to window glass. The method used by most entailed soaking a long sponge in an ATO solution and using it to coat the window from top to bottom. This proved to be of limited practicality, though, as the difficulty of adjusting the pressure applied resulted in distortions and unevenness. Other companies attempted to pour the solution down

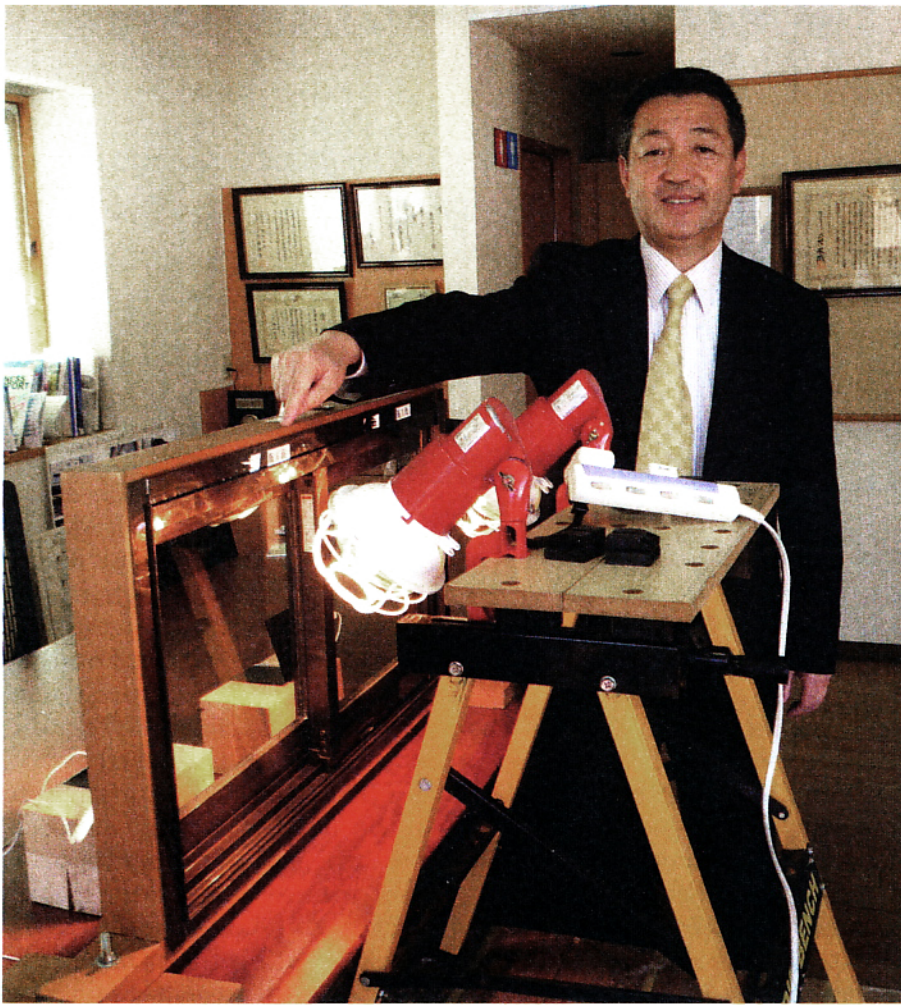
the top of the window. But the solution would run off before drying completely, leaving the upper part of the window uncoated. Making the process viable seemed daunting, but Yagisawa had an idea.

"I reasoned that a uniform coating could be achieved by using a spray. Yet when I sprayed it on, reflected light scattered off the surface, and the glass turned cloudy. We made repeated adjustments to such variables as nozzle diameter, pressure, and the composition of the coating agent. As a result of such trial and error, we selected a thicker nozzle for spraying the ATO. Also, to prevent running, we dried it out by using warm air to spread it over the surface of the glass." Thus, in 2006, the company's method for coating glass using a spray gun was complete.

Expanding Overseas

The company's revolutionary technique for treating large and even curved glass surfaces soon caught the attention of Japan's Ministry of Economy, Trade, and Industry and Ministry of the Environment. It took just a year and a half for Fumin to receive a patent for its technology, and the ministries provided support for its participation in trade shows both in Japan and overseas.

"The reaction overseas was particularly strong. Buildings these



Fumin President Yagisawa demonstrates the transparency of coated glass, foreground, and uncoated rear pane.

days have large areas of window glass, and countries in hot regions like the Middle East and Southeast Asia had been struggling to find a way to deal with the sunlight that comes in through the glass. The heat in such places makes air conditioning a necessity, but this results in huge emissions of carbon dioxide. One way to counter this is to use costly UV-resistant glass. Although this has the effect of reducing interior heat, it also causes UV rays to reflect off the window's surface. This contributes to the 'heat island' effect, where temperatures in cities become higher than those in surrounding rural areas.

"In Singapore, where the average annual temperature is over 30 degrees Celsius, window glass must have a reflectivity of no more than 10 percent, the same as that of standard glass, in order to qualify for the country's highest-ranking eco-label. Ordinary UV-protective glass achieves higher protection by increasing its reflective properties, inevitably raising its reflectivity and effectively making it unusable in Singapore. Fumin's coating, though, has a reflectivity of just 6 percent—less than standard glass—thanks to its use of an innovative ATO. When we gave a presentation to the Singaporean government,

they were impressed by how easily our product could be applied to window glass. But what they liked best was its low reflectivity. They summoned construction company representatives to the meeting to ask whether they could make use of our coating. We've received the Platinum Award, Singapore's highest level of green certification for eco-friendly products."

Fumin established a subsidiary in Singapore in 2008 and obtained a patent for its technique. Including demonstrations on windows in office buildings and other structures, it has completed 12 projects so far, and its coating has been warmly praised for helping to conserve energy. Japanese construction firms are already planning to apply the coating to windows in their high-rise buildings, and the company intends to obtain patents in the United States, China, India, and the European Union.

"Applying the coating is so easy that anyone can do it: just clean the glass, put masking tape around the edges, and spray it from the can. We only have four people in our company, so we have no problem with letting someone else take care of the actual application. In the city of Tama in Tokyo, for example, we worked with a local support group to give people with disabilities jobs applying our coating. And in addition to its environmental benefits, some car dealerships, whose buildings have large areas of glass, have used our coating to provide work for employees who were set to be laid off.

"Overseas too, eventually we want to have our coating agent produced locally and get local companies to act as representatives. Our hope is that it will be used worldwide to reduce emissions of CO₂ while at the same time creating new jobs."