ECOLOGY

GREENART on Osaka 2025 World Expo

Courtesy BeWarrant

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WHEN ART MEETS COSMETICS: GREENART AT THE OSAKA EXPO

From 3 to 5 May, European GREENART project takes centre stage at the Osaka World Expo, showcasing how green technologies can transform both art restoration and the cosmetics industry.

At the heart of the Osaka 2025 World Expo, the European Union Pavilion presents GREENART at the beginning of May. This flagship project, funded under the Horizon programme, aims to produce sustainable solutions for conservation-restoration and preventive conservation of heritage. The team develops low-impact, environmentally friendly materials, sourced from renewable natural resources or recycled waste.

Visitors, young and old, spend three days experimenting with innovative, sustainable restoration techniques developed by GREENART. They handle green nanomaterials, manufacture bio-based cleaning gels and dust models of artworks. The project's researchers lead practical workshops, allowing everyone to discover these cutting-edge methods first-hand. The demonstration, entitled "Sustainable materials: From art to cosmetics", pursues another goal as well: to prove how green technologies can revolutionise two sectors that, at first glance, seem unrelated — cultural heritage conservation and the beauty industry. In partnership with global cosmetics giant Shiseido, the GREENART workshops highlight international collaboration between European and Japanese partners, and reveal the potential for new interdisciplinary applications. The event explores the parallels between restoring paintings and the science of skincare.

"I had the good fortune to meet Professor Piero Baglioni, Director of the Centre for Colloid and Surface Science (CSGI) at the University of Florence, who stands as a leading figure in my fields of research. Without hesitation, when he launched the GREENART project, I decided to join him," says Taku Ogura, principal researcher at Shiseido and visiting associate professor at Tokyo University of Science, specialising in surfactant science and surface chemistry [see box p.70]. "Moreover, the European Union is developing some truly fascinating initiatives in the preservation of art and paintings, which is highly stimulating for research." Author of hundreds of publications and dozens of patents, Piero Baglioni has indeed pioneered the application of bicontinuous microemulsion technology to the conservation of cultural heritage — having worked in the laboratory of Pierre-Gilles de Gennes, Nobel Prize winner in Physics in 1991. "Through Piero, I also learned from Pierre-Gilles. So, this is a continuation towards the new generation," the Japanese researcher notes, visibly moved and proud.

The microemulsion revolution

A sophisticated technology with surprising applications,

— Carine Claude

microemulsion stands as a key focus of research and development at GREENART — and in the cosmetics industry. "This technology enables the selective removal of stains, both from the surface of artworks and from the skin," explains Taku Ogura, an expert in the field. "For example, when restoring paintings, we want to remove only the stains without damaging the paint layer itself. Previous technologies sometimes accidentally removed parts of the painting."

This surgical precision resonates within the cosmetics industry. "People want to remove stains, makeup and foundation while preserving the skin's natural moisturising factors, which are essential for skincare, continues the Shiseido researcher. Microemulsion technology can gently eliminate only the targeted substances." The same technological backbone adapts to different applications. "To remove a black, grimy layer from a painting, we select specific surfactants and oils, he explains. For cosmetics, when we work with lipstick, we also choose different surfactants and oils. It is the same technology, but we must select the right ingredients." Cleansers, lotions and serums — microemulsion technology plays a "very important" role in the products developed by Shiseido, renowned for its luxury ranges. The researcher also leads one of the GREENART introductory workshops, demonstrating how the same materials and technologies used in art restoration find applications in the cosmetics industry — and *vice versa*.

A pop-up laboratory

Like a pop-up laboratory, the GREENART space at the Osaka Expo offers three interactive workstations for visitors of all ages, turning science into hands-on experimentation. Alongside Taku Ogura and Isao Yotanda, associate professor in the Department of Advanced Chemistry at Tokyo University of Science, the European team gets involved in designing and running the programme: Andrea Casini and Rachel Camerini, young postdoctoral researchers specialising in nanoparticles and biopolymers; Giovanna Poggi, an expert in hydrogels and organogels; Silvia Lob, a specialist in physico-chemical interactions at the nanoscale and Isella Vicini, director of European funding development. All work under the scientific coordination of CSGI (Centre for Colloid and Surface Science), the renowned Italian centre of excellence led by Piero Baglioni, who heads the international consortium of museums and universities that make up GREENART.

For adults, the alginate sphere workshop offers the chance to create the flags of Italy, Japan and the European Union. Made from a natural polymer extracted from brown seaweed, mixed

3 questions to... Taku Ogura

Taku Ogura serves as principal researcher at Shiseido and at the MIRAI Technology Institute.

How did the Shiseido Group decide to get involved in GREENART? After all, skincare and artworks seem to be very different fields…

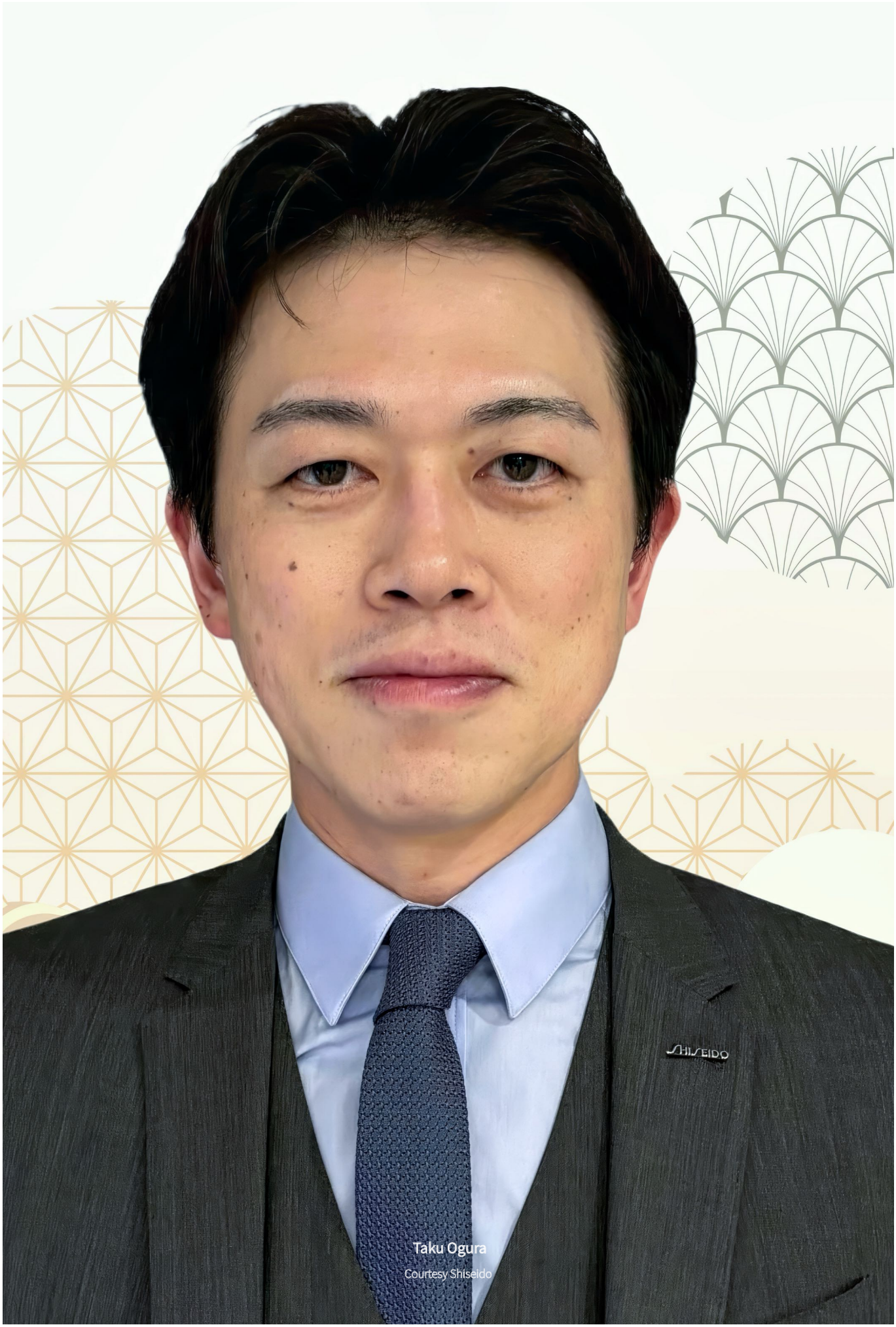
It is actually a scientific connection. Our project focuses mainly on using hydrogels to remove stains from artworks and paintings. This technology involves microemulsion cleaning, which is also highly important in the cosmetics field. One of Shiseido's flagship products is a microemulsion cleanser for the skin. We need to master this peeling technique and combine it with the "green" aspect of GREENART — that is, sustainable, natural and biocompatible approaches, which are crucial in cosmetics. That is why Shiseido joined this project.

Does sustainability form part of Shiseido's corporate philosophy?

Yes, Shiseido's policy and philosophy revolve around a key concept: "Art and science", which has been in the group's DNA since its founding in the late nineteenth century. This means we focus on developing cosmetic technology while considering the face as a canvas. We always strive to advance technologies, combining art and science.

How does your laboratory at Shiseido work with the GREENART project?

I focus on how the results of the GREENART project can be used for industrial applications, particularly in cosmetics. I also work at the University of Tokyo in an academic role, integrating this technology into other industrial fields, such as the metallurgical industry. The GREENART project centres on the sustainability of technologies and "green" materials, which can also be applied beyond heritage preservation. Cosmetics have already made progress in terms of eco-responsibility but other sectors of the chemical industry still rely on petroleum and hazardous products.



Taku Ogura

Courtesy Shiseido

Teresa Guaragnone from CSGI

Courtesy CSGI

with coloured liquid and a calcium chloride solution, these small beads — with a liquid core and a soft shell — provide a hands-on demonstration of the principles of gelation and encapsulation.

For younger visitors, researchers guide children in making rheopectic slime — a viscous, starch-based paste that turns solid when pressed. Fun and completely safe, this excellent educational tool helps explain the properties of complex fluids and gels developed by the GREENART project, showing how certain materials can change their behaviour depending on how they are handled. The activities use specially prepared models that reproduce abstract artworks in the style of Pollock, samples of traditional paintings and even Japanese manga illustrations covered in earth, which the children must patiently clean.

“The exhibition aims to raise awareness of the social relevance of restoration, the importance of scientifically supported methodologies and the potential for new interdisciplinary applications,” the organisers emphasise. The societal implications of these green technologies are wide-ranging: sustainable museum practices, art education, skin protection, cleaning and regeneration and the development of a circular economy. This holistic approach reflects the spirit of the Osaka World Expo, whose theme — “Designing future society for our lives” — encourages reflection on innovations that serve humanity.

Osaka 2025 World Expo

Courtesy Osaka World Expo