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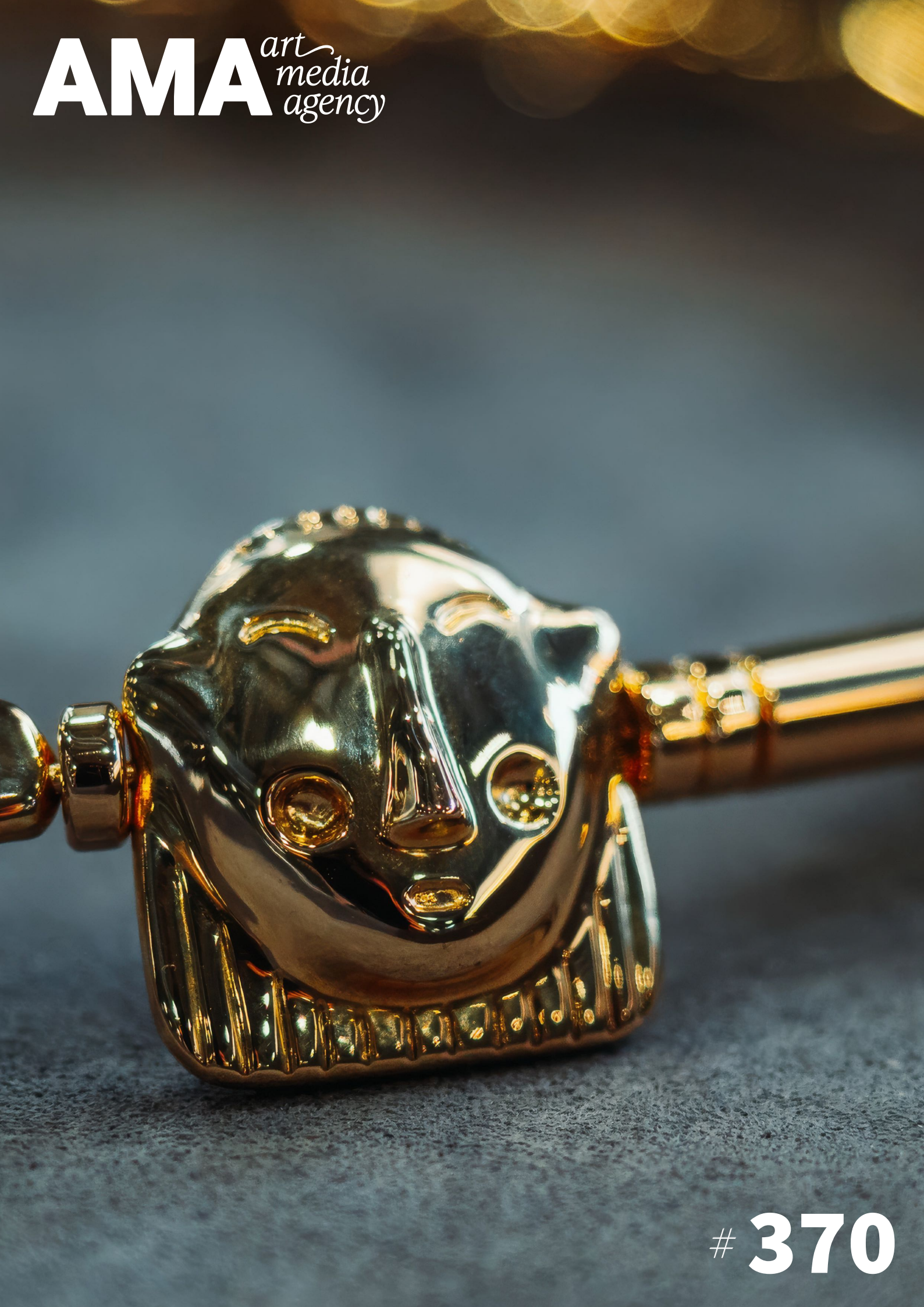

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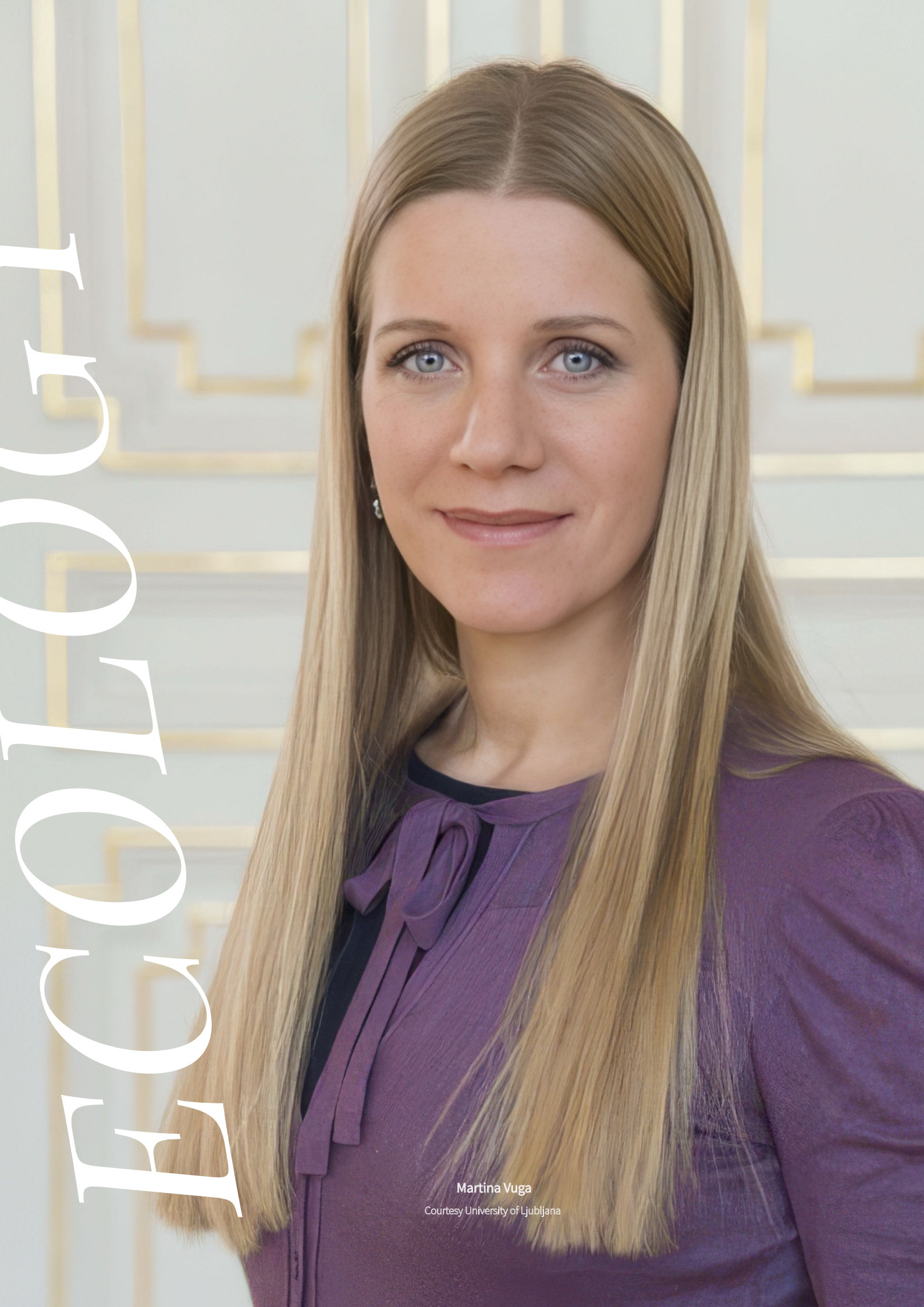

Martina Vuga

Courtesy University of Ljubljana

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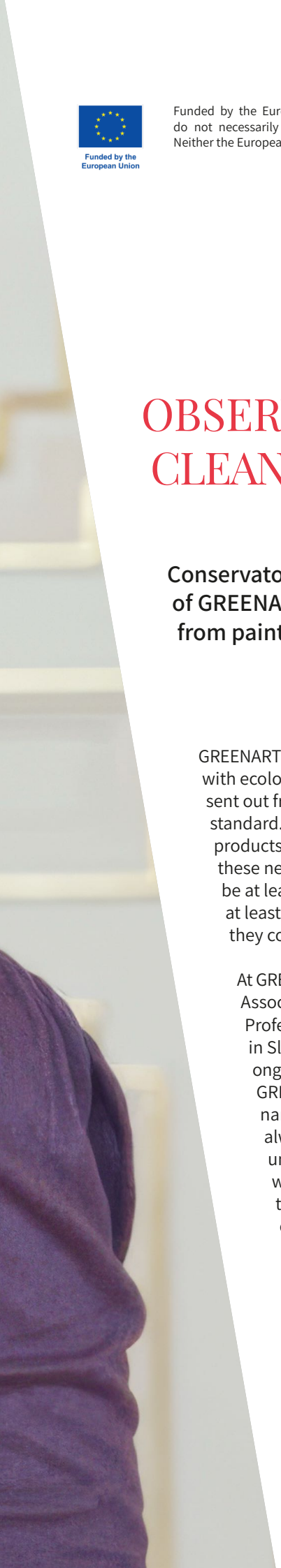


# OBSERVATIONS ON GREENART'S NEW CLEANING SYSTEMS FOR VARNISH REMOVAL

**Conservators with the University of Ljubljana have been testing the effectiveness of GREENART's gels and nanofluids on the removal of natural varnish from paintings and wooden sculptures.**

GREENART's new art conservation solutions are being formulated with ecological sustainability in mind. By the time a solution is sent out from the lab for real world testing, it already meets that standard. The professional conservators enlisted to test the products then have a host of their own standards they expect these new solutions to meet. For example, they need them to be at least as effective as existing products on the market and at least as affordable and shelf stable — otherwise how could they convince their institutional employers to adapt?

At GREENART's public training in Paris on 10 and 11 April 2025, Associate Professor Lucija Močnik Ramovš and Assistant Professor Martina Vuga, both from University of Ljubljana in Slovenia, delivered a talk sharing the results of their ongoing testing [see p.104]. The pair has been working with GREENART's Work Package 2 which produces new green nanofluids and organogels since October 2023. "I was always interested in what is going on behind the scenes, understanding materials, says Ramovš, so this project was something I was really looking forward to. In theoretical ways it is interesting, because it combines chemistry with our conservation work. It is helping us understand the behaviour of materials. The more we test these products, the more we understand."

Their main focus was on varnish removal, so they specifically looked for older artworks to test the products on. They sought pieces that showed significantly altered varnish appearances, with a suitable varnish thickness on relatively stable painted surfaces. They looked at ease of preparation of the new cleaning solutions, ease of application, adaptation of the solutions to the surface of the various artworks, ease of removal of the products and the effectiveness of the products in removing varnish from the artworks. Specifically, their testing centred on removal of natural varnishes from a 19th century polychrome wooden sculpture and two oil paintings on canvas.

"For the paintings, we tested the various materials on similar surfaces, making comparisons of different gel systems, Ramovš says. We tested various application times. Many materials were successfully used. There was no universal solution. For example, two paintings may have the same type of varnish applied to the painting with the same binder, but the effectiveness of the system may be different." Their conclusions regarding GREENART's cleaning solutions on the paintings were largely positive — for the most part the varnishes were successfully removed.

For the sculpture, however, they had more mixed results. "Of course, there are different challenges when working with 2D and 3D objects,

*— Pierre Naquin and Phillip Barcio*

Vuga says. With paintings, the surfaces are generally flat, making gel application relatively straightforward. In contrast, 3D objects present greater challenges in terms of the flexibility and adaptability of the gels needed to ensure proper contact. That said, similar difficulties can also arise with heavily textured or *impasto* paint layers on 2D surfaces."

"A common problem I see in sculptures is overpainting, says Vuga. Removing overpaint is very difficult with traditional materials." The sculpture she selected had a surface with a particularly complex structure caused by deep brush marks. Layers of varnish had accumulated in the low spots of the brush marks. There was also gilding, so in the end the overpainting was really thick. The polychromatic surface further complicated the process. "I thought maybe if I applied these new cleaning materials for several hours they could do something," Vuga says. But in the end it was clear that GREENART's cleaning solutions were insufficient in this particular test case. They were more time consuming to prepare and apply than existing products and they showed signs that they could potentially cause damage to the sculpture's surface.

Ramovš and Vuga also have thoughts about the shelf life of the products and how the solutions are being packaged. "The gels have limited time use, Ramovš says. That means you cannot afford to buy a lot of these materials if you do not think you are going to use them quickly." After the use-by date, the materials would have to be thrown away, so even if they are more "green" in the beginning, that designation goes away once they perish. "If they only last for a year and then are also packaged in plastic, you have to think about that, too," she says.

**A collective effort**

The beauty of GREENART's testing process is that researchers are keen to receive what could be called "negative feedback" from real world testers. These reports are not the end of the process, but simply the next phase. Constructive back and forth has been part of the project from the start of each collaboration. For example, at the start of their relationship with GREENART, Ramovš and Vuga had ideas about the specific challenges they faced in their conservation work. "I had in my mind what would be possible with the problems we have, Ramovš says and asked the scientists if they could suggest solutions to us."

"We had many meetings before we received the materials and had many questions about them afterward, Vuga adds. I had questions about the stability of the organogels and hydrogels, so we asked questions and were prepared in advance." GREENART's testing process is not only a collaborative effort between conservators in the field and GREENART's scientists back in the lab. In the case of Ramovš and Vuga, the collaboration also included their students. "Because we are professors, we have Masters students who have time to arrange for research, Ramovš says. We always can find some students who are interested. They can prepare the materials and so on, so we do not have to do everything on our own. It is good if you work together. If you are alone, it is difficult."

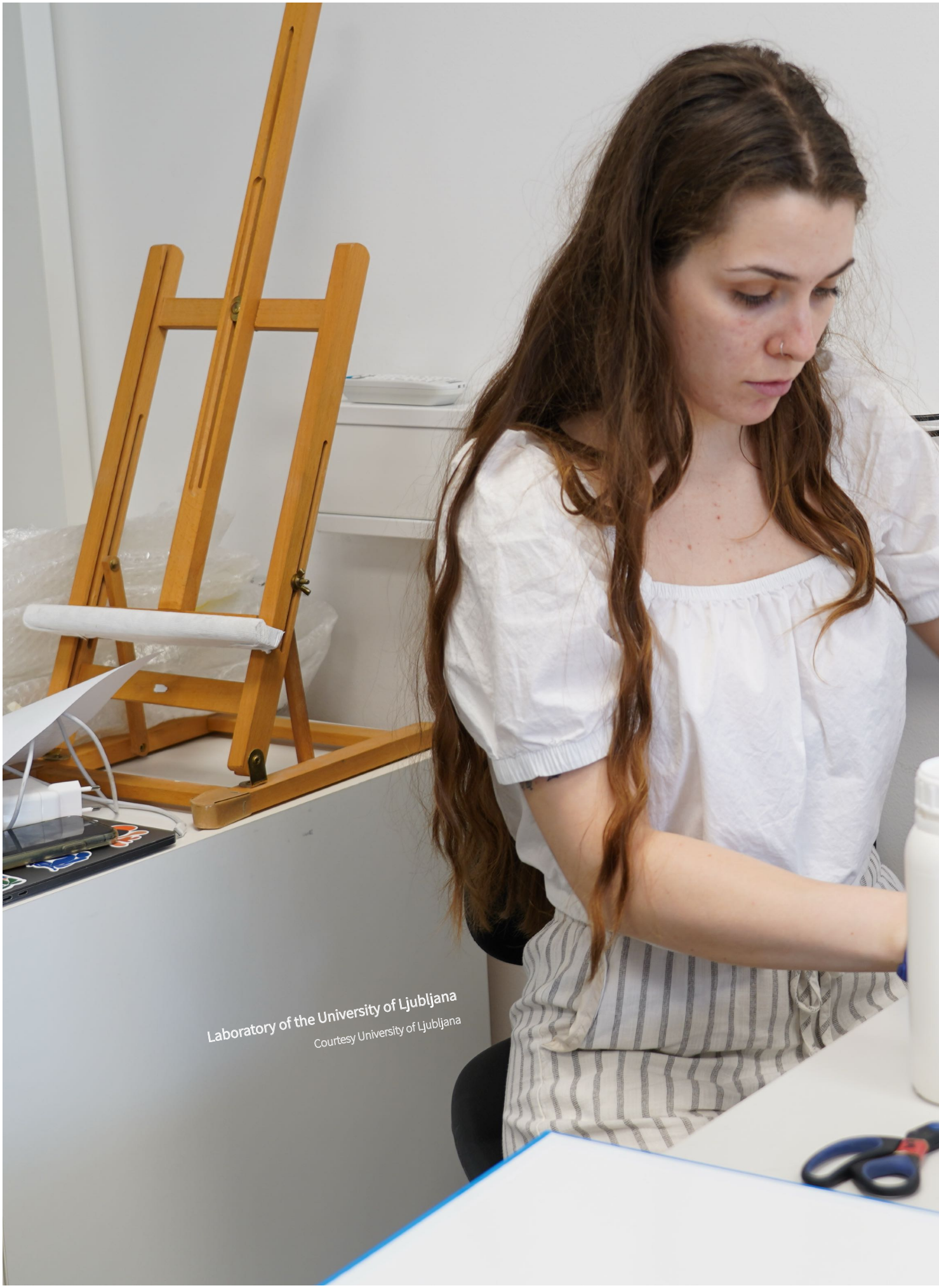
The testing is also a collaboration between a wide range of institutions who are all simultaneously testing the products in various different conditions. Ramovš and Vuga have participated in regular feedback sessions that include researchers at other institutions, who each present their findings. "We held monthly online meetings where we regularly shared experiences, insights and discussed any issues that arose. They hear us and we hear them and exchange knowledge, Vuga says. We are quite a big group doing different work. There are some who work on sculptures, but even if they present contemporary art or paintings or works on paper, you always can use the knowledge wherever it comes from. It is very important even if it is not exactly the same as yours."

These exchanges are particularly important because it offers an inside glimpse at how various research groups are developing the specifics of their testing protocols. "Using these materials is not just a matter of selecting the right gels, Vuga says. It is also about the overall approach to choosing and combining materials. We always use gels in conjunction with various liquids, meaning the effectiveness depends on the combined action of all components. The physical properties of the gels play a significant role, which is why we do not adopt new materials simply because they are innovative, but rather consider them as additional tools in our toolkit. What is most important is to understand both the surface being treated and the composition of the materials involved, alongside a thoughtful and informed approach."

By the time a group distills their findings in all of these areas in preparation for an event like the recent public training in Paris, many of those intricate details are left out, because they are perhaps too esoteric and granular for a public talk. "When you present the work to the public you have to concentrate your outcomes, so people never know what was going on behind the scenes," Vuga says. Ramovš adds that it will also be nice to learn about what happens in the laboratory after the scientists receive feedback from these real world tests. "You know about this new material, how it works and you have all these different test cases, so it will be good to hear going forward how the scientists are dealing with the results…"

Lucija Močnik Ramovš

Courtesy Université de Ljubljana


Laboratory of the University of Ljubljana
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