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ECOLOGY

An interior view of the Department of Chemistry "Ugo Schiff" at the University of Florence (DICUS) which hosts the Center for Colloid and Surface Science (CSGI), coordinator of the GREENART project.

Photo Mickaël Pijoubert. © Art Media Agency

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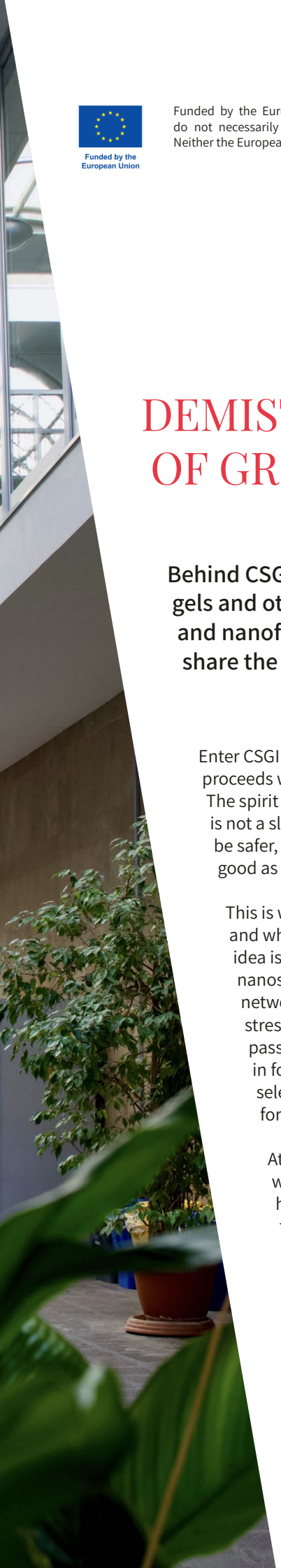


DEMISTIFYING THE PRODUCTION OF GREENART'S SECRET GELS

Behind CSGI's lab doors, green chemistry meets fragile art. Here "Peggy" gels and other microemulsions travel from beaker to canvas, carrying water and nanofluids with surgical calm. Chemists, researchers and microscopes share the bench; mock-ups take the risks so museum works don't have to.

Enter CSGI at the University of Florence, where research proceeds with a quiet focus and an easy collegiality. The spirit is studious but warm Here, green chemistry is not a slogan but a working constraint: materials must be safer, methods more contained, outcomes at least as good as the *status quo* — or they do not leave the room.

This is where Nanorestore' "Peggy" hydrogels came of age and where new variants are refined within GREENART. The idea is simple and demanding at once: carry aqueous or nanostructured cleaning fluids in a controlled, sheet-like network; release them slowly; lift unwanted layers without stressing what lies beneath; leave no mark of your passage. The practice is incremental. Mock-ups stand in for canvases and polychrome surfaces; trials compare selectivity, working time, residue; small adjustments in formulation are recorded, argued, kept or set aside.

At the centre of this work is Professor Piero Baglioni, who steers by (im)patience and precision. Alongside him, conservation scientist Davide Chelazzi keeps the line open between chemistry and practice: what a gel can do on paper is never separated from what a conservator needs it to do on a surface.

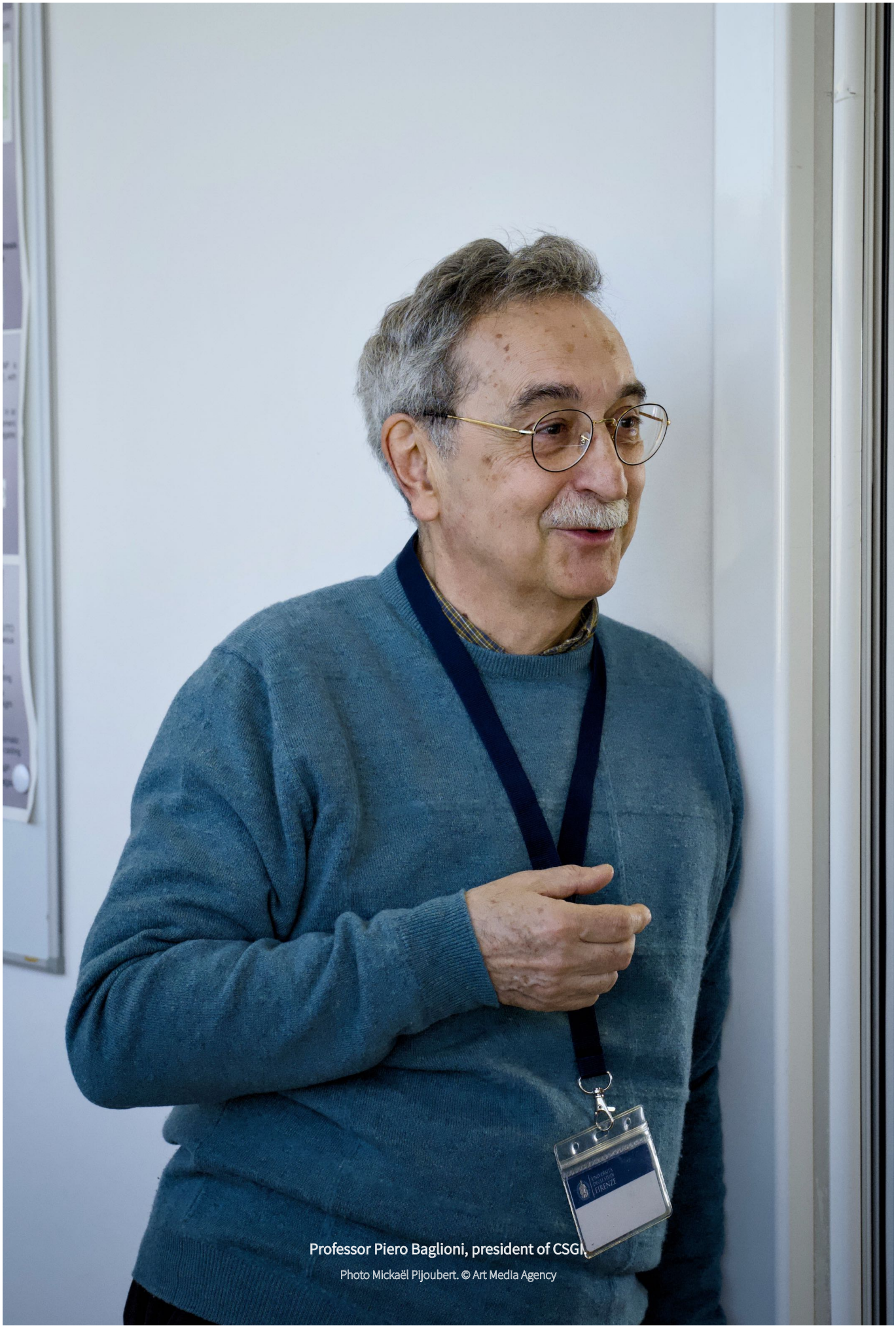
Carrying much of the day-to-day production are two PhD researchers, Andrea Casini and Teresa Guaragnone. They are the hands that translate recipes into reliable sheets, the eyes that catch the small differences between an almost and a right. There is always room for a smile or a quick joke… the kind of easy rapport that makes long days feel shorter.

Much of what leaves the lab is made to measure. CSGI produces near-bespoke gels in response to conservation briefs from museums. Requests arrive with constraints; the lab replies with options, notes and (mostly) magical solutions.

GREENART's expectations — lower toxicity, renewable or waste-derived inputs where effective, confined application that limits exposure, clear documentation for training — are integrated everywhere into the work. The gels happen to embody the approach, but the approach is larger: do more with water; make selectivity the first virtue; prefer lifting to dissolving; match performance with responsibility.

By day's end, the lab has produced what looks, from a distance, like clarity: stacks of transparent white sheets, labelled and logged. Up close, one would instantly notice all the work behind it — constant small iterative improvements — as well as the temperament that goes with it: caring, collaborative and fun.

— Pierre Naquin



Professor Piero Baglioni, president of CSGI.

Photo Mickaël Pijoubert. © Art Media Agency

A CSGI researcher adds reagents into a laboratory reactor to prepare a reaction batch. By controlling temperature and mixing speed, a polymeric dispersion can be produced. It then undergoes freeze-thaw cycles, yielding a gel with properties optimised for the controlled and effective cleaning of delicate artistic surfaces.

Photo Mickaël Pijoubert. © Art Media Agency


ELECTRONIC SCALE
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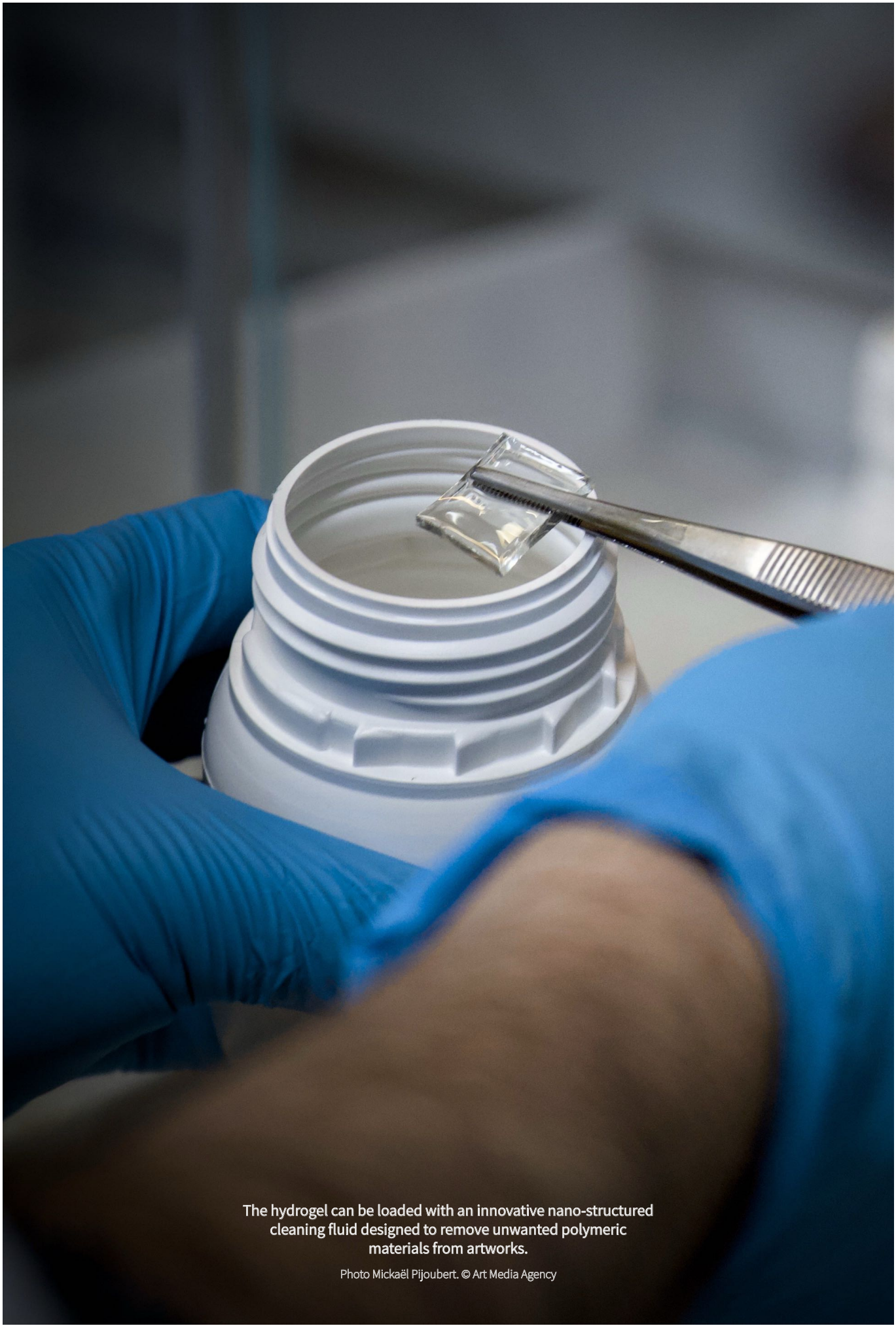
A CSGI researcher from the GREENART project selects the polymeric precursors that will form the gel's matrix.

Photo Mickaël Pijoubert. © Art Media Agency

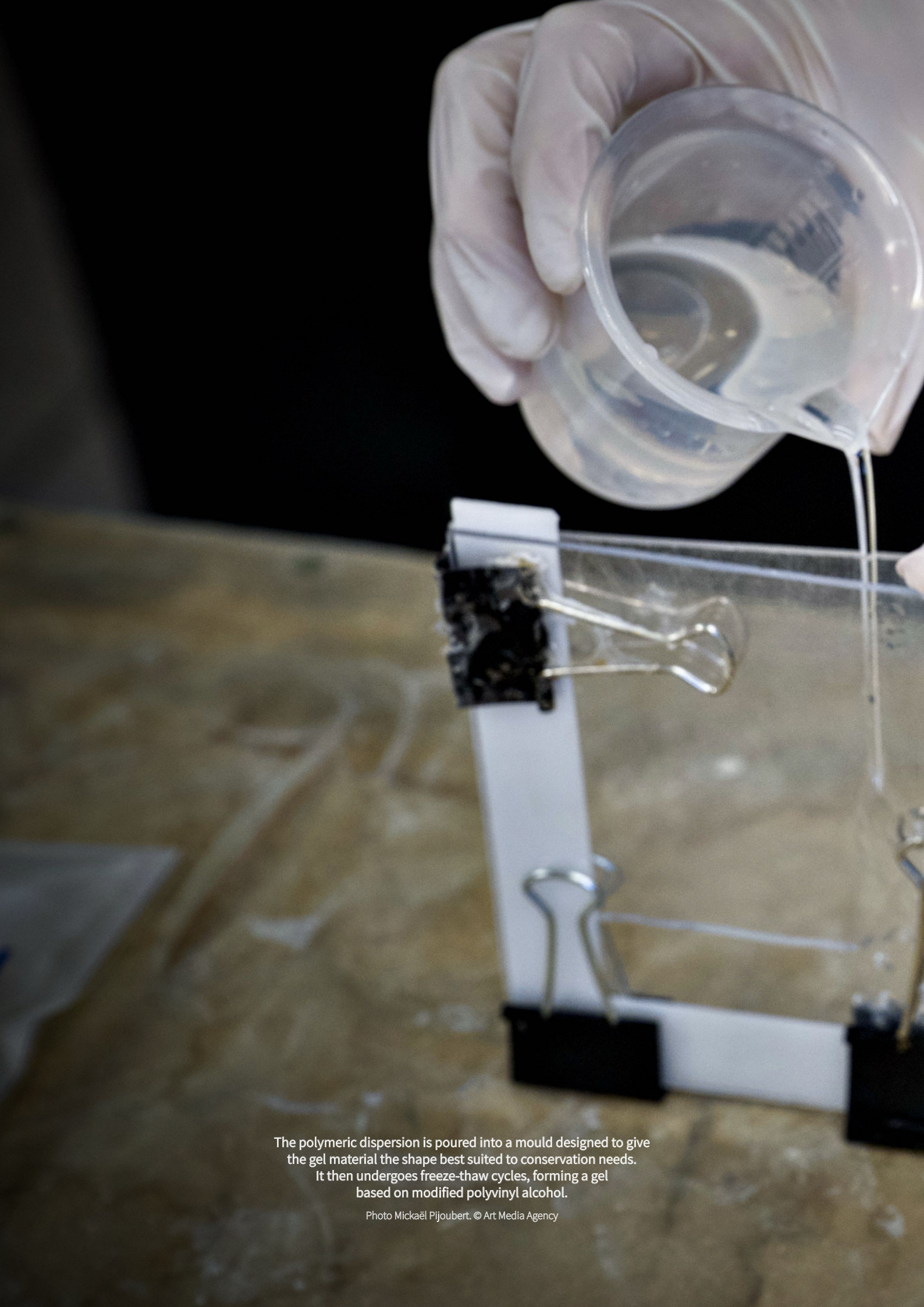
A newly developed polymer solution is being handled in the lab. By tuning its composition, researchers can chemically engineer eco-friendly hydrogels that effectively remove unwanted substances while remaining safe to both artworks and the environment.

Photo Mickaël Pijoubert. © Art Media Agency



The hydrogel can be loaded with an innovative nano-structured cleaning fluid designed to remove unwanted polymeric materials from artworks.

Photo Mickaël Pijoubert. © Art Media Agency



The polymeric dispersion is poured into a mould designed to give the gel material the shape best suited to conservation needs. It then undergoes freeze-thaw cycles, forming a gel based on modified polyvinyl alcohol.

Photo Mickaël Pijoubert. © Art Media Agency

A novel “twin-chain” hydrogel, synthesised from modified renewable polyvinyl alcohol through freeze-thaw cycles, is employed to gently remove water-soluble dirt from a model modern art surface. Its unique polymer network adapts to uneven textures, cleans in a controlled way and leaves no residue, supporting the project’s sustainability goals.

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