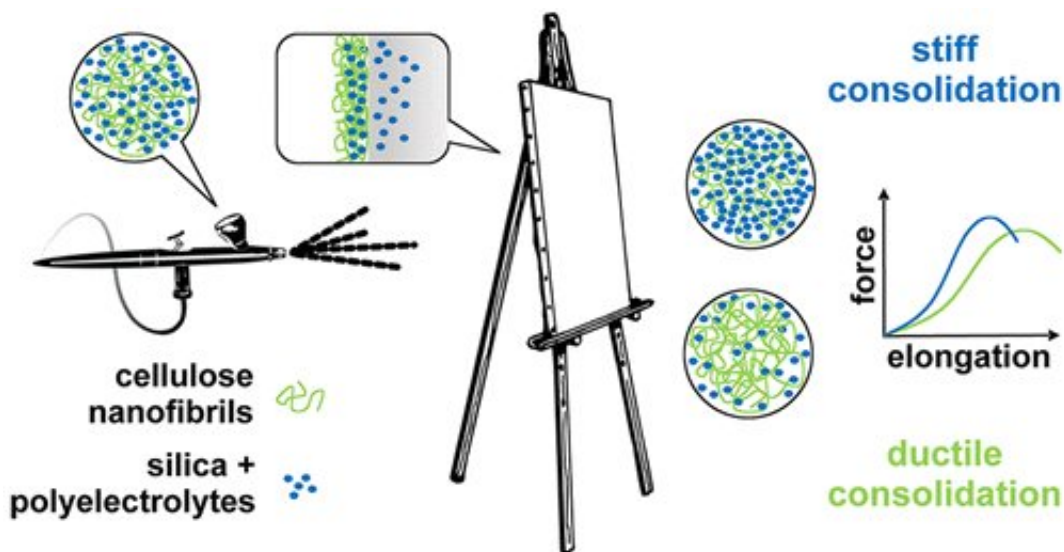


Preserving a painter's legacy with nanomaterials

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Credit: American Chemical Society

Paintings by Vincent van Gogh, Pablo Picasso and Johannes Vermeer have been delighting art lovers for years. But it turns out that these works of art might be their own worst enemy—the canvases they were painted on can deteriorate over time. In an effort to combat this aging process, one group is reporting in *ACS Applied Nano Materials* that nanomaterials can provide multiple layers of reinforcement.

One of the most important parts of a painting is the canvas, which is usually made from cellulose-based fibers. Over time, the canvas ages,

resulting in discoloration, wrinkles, tears and moisture retention, all greatly affecting the artwork. To combat aging, painting conservators currently place a layer of adhesive and a lining on the back of a painting, but this treatment is invasive and difficult to reverse. In previous work, Romain Bordes and colleagues from Chalmers University of Technology, Sweden, investigated nanocellulose as a new way to strengthen painting canvases on their surfaces. In addition, together with Krzysztof Kolman, they showed that [silica nanoparticles](#) can strengthen individual paper and cotton fibers. So, they next wanted to combine these two methods to see if they could further strengthen aging canvas.

The team combined polyelectrolyte-treated silica nanoparticles (SNP) with cellulose nanofibrils (CNF) for a one-step treatment. The researchers first treated canvases with acid and oxidizing conditions to simulate aging. When they applied the SNP-CNF treatment, the SNP penetrated and strengthened the individual fibers of the canvas, making it stiffer compared to untreated materials. The CNF strengthened the surface of the canvas and increased the canvas's flexibility. The team notes that this treatment could be a good alternative to conventional methods.

More information: Krzysztof Kolman et al. Combined Nanocellulose/Nanosilica Approach for Multiscale Consolidation of Painting Canvases, *ACS Applied Nano Materials* (2018). [DOI: 10.1021/acsnm.8b00262](https://doi.org/10.1021/acsnm.8b00262)

Abstract

The restoration of painting canvases is a complex problem that, because of the hierarchical nature of the canvas, requires intervention at several length scales. We propose an approach combining polyelectrolyte-treated silica nanoparticles (SNP) and cellulose nanofibrils (CNF) for canvas consolidation. The formulations, applied on model-degraded canvases, gave a total weight increase of

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