

# Hydrogels and organogels for the conservation of Cultural Heritage: from renaissance frescoes to modern and contemporary art

P. Baglioni

Department of Chemistry and CSGI, University of Florence, Florence, Italy

We pioneered one of the most exotic applications of soft matter and materials science to conservation of cultural heritage. Art Conservation poses a formidable and exciting challenge to soft matter-colloid scientists in two respects. First, the majority of the most performing and environmentally safe cleaning and consolidation agents for artworks are soft matter systems. Second, the interaction of these agents with the artifact involves an exceptionally complicated range of interfacial interactions. Works of art surfaces interacting with the environment are the most prone to aging and decay: soiling is a prime factor in the degradation of surfaces, chemical and mechanical degradation are often associated to soiling, leading to the disfigurement of a piece of art. The effects of these processes are usually strongly amplified in the presence of protective coatings (mainly acrylic and vinyl polymers), applied in previous restoration treatments. We pioneered the synthesis and the application of several advanced systems for the cleaning of works of art, as micellar systems, microemulsions, physical and chemical gels. I will report on the new advanced cleaning systems: 1) twin-chain polymer hydrogels, based on poly(vinyl-alcohol), 2) the poly(vinyl alcohol/starch gels, and 3) "green" castor oil organogels. These gels outperformed classic gels used in conservation (gellan, agar, klucel, etc.), allowing cleaning processes impossible with conventional methodologies. These new systems mark a paradigm shift in modern conservation and have been used on classic, modern and contemporary artifacts as paintings by Picasso, Lichtenstein, Pollock, de Chirico, Banksy, Eva Hesse, and many others.

## References

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