

Nanoscience and Conservation

Piero Baglioni

Center for Colloid and Nanoscience (CSGI), Department of Chemistry, University of Florence. Italy

baglioni@csgi.unifi.it

Abstract: Works of art and artifacts that constitute our cultural heritage are subject to deterioration. Their surfaces interacting with the environment are the most prone to aging and decay; accordingly, soiling is a prime factor in the degradation of surfaces, chemical and mechanical degradation are often associated to soiling and lead 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.

In the past years we pioneered the synthesis and the application of several advanced systems for the consolidation and the cleaning of works of art, as hydroxides nanoparticles, microemulsions and chemical/physical gels.

In this talk examples will be highlighted on nanoparticles for the consolidation of wall paintings and on self assembled systems for the cleaning or the removal of coatings from pictorial surfaces; i) microemulsions and micellar solutions optimized for the removal of acrylic, vinyl and alkyd polymers; ii) chemical, physical, and smart gels with confined microemulsions or micellar solutions.

Keywords: Nanoparticles, Calcium Hydroxide, Micelle, Microemulsions, Physical Gel, Chemical Gel, Consolidation, Cleaning, Wall Paintings, Easel Paintings

References

- 1) P. Baglioni, D. Chelazzi, Nanoscience for the Conservation of Works of Art, Royal Society of Chemistry, 2013.
- 2) D. Chelazzi, G. Poggi, Y. Jaidar, N. Toccafondi, R. Giorgi, P. Baglioni, Hydroxide nanoparticles for cultural heritage: Consolidation and protection of wall paintings and carbonate materials. *Journal Colloid Interface Sci.* 2013, 392, 42–49.
- 3) R. Giorgi, M. Baglioni, D. Berti, P. Baglioni, New Methodologies for the Conservation of Cultural Heritage: Micellar Solutions, Microemulsions, and Hydroxide Nanoparticles. *Acc. Chem. Res.* 2010, 43, 695–704.
- 4) Baglioni, M.; Rengstl, D.; Berti, D.; Bonini, M.; Giorgi, R.; Baglioni, P. Removal of acrylic coatings from works of art by means of nanofluids: understanding the mechanism at the nanoscale. *Nanoscale* 2010, 2, 1723–1732.
- 5) Baglioni, M.; Giorgi, R.; Berti, D.; Baglioni, P. Smart cleaning of cultural heritage: a new challenge for soft nanoscience. *Nanoscale* 2012, 4, 42–53.
- 6) Baglioni, M.; Berti, D.; Teixeira, J.; Giorgi, R.; Baglioni, P. Nanostructured Surfactant-Based Systems for the Removal of Polymers from Wall Paintings: a SANS Study. *Langmuir*, 2012, 28, 15193–15202.
- 7) Carretti, E.; Fratini, E.; Berti, D.; Dei, L.; Baglioni, P. Nanoscience for Art Conservation: Oil-in-Water Microemulsions Embedded in a Polymeric Network for the Cleaning of Works of Art. *Angew. Chem. Int. Ed.* 2009, 48, 8966–8969.

@No kinship is present among the authors