

## Development of green protective coatings for the conservation of silver artworks

F. Boccaccini,<sup>a</sup> A. Barbetta,<sup>a</sup> M. Pascucci,<sup>a</sup> C. Riccucci,<sup>a</sup> E. Messina,<sup>a</sup> G. Di Carlo<sup>a</sup>

<sup>a</sup>Institute for the Study of Nanostructured Materials (ISMN), National Research Council (CNR), SP35d, 9, 00010 Montelibretti, RM

*francescaboccaccini@cnr.it*

The conservation of silver artworks is challenging, since they promptly interact with sulphur-containing airborne species, resulting in the rapid darkening and degradation of their surfaces. To prevent corrosion and ensure a long-term preservation, protective coatings are commonly applied on silver artifacts. In a previous work, we developed and tested waterborne chitosan-based coatings as possible alternative to traditional acrylic resins, that are widely used by conservators despite their harmful effects on human health and the environment [1]. Chitosan is an attractive polymer because it is inexpensive, biodegradable, and produced from waste materials (fishing industry residues). Additionally, it can produce transparent, colorless, and removable films, making it a highly promising option for use in conservation.

Within the European GREENART project (GREen ENdeavor in Art ResToration, grant agreement n. 101060941), the previous formulation has been revised and optimized to produce coatings with improved protective efficacy and chemical-physical stability. The aesthetic and protective properties of the novel formulations were deeply investigated by UV-VIS spectroscopy, colorimetry and accelerated aging tests, while the long-term stability was investigated and validated after one year of natural aging. The film alteration observed after a prolonged exposure to uncontrolled environmental conditions in the previous formulation was addressed in novel ones.

[2] F. Boccaccini, C. Giuliani, M. Pascucci, C. Riccucci, E. Messina, M. P. Staccioli, G. M. Ingo, G. Di Carlo, *International Journal of Molecular Sciences* 2022, 23(22), 14454.