

Effects of the ionizing radiation disinfection treatment on historical leather

Monia Vadrucci¹, Giovanni De Bellis^{2,3}, Claudia Mazzuca⁴, Fulvio Mercuri⁵, Fabio Borgognoni¹, Emily Schifano⁶, Daniela Uccelletti^{6,3}, Cristina Cicero^{2,3}

¹: Particle Accelerator for Medical Application Laboratory, Italian National Agency for New Technologies, Energy and Sustainable Economic Development ENEA, via E. Fermi, 45, 00044, Frascati (RM), Italy.

²: Department of Astronautical, Electrical and Energy Engineering (DIAEE), Sapienza University of Rome, via Eudossiana, 18, 00184, Rome, Italy.

³: Research Center for Nanotechnology applied to Engineering (CNIS), Piazzale Aldo Moro, 5, 00185, Rome, Italy.

⁴: Department of Chemical Sciences and Technologies, Tor Vergata University of Rome, Via della Ricerca Scientifica, 1, 00133 Rome, Italy.

⁵: Department of Industrial Engineering, Tor Vergata University of Rome, Via del Politecnico, 1, 00133 Rome, Italy.

⁶: Department of Biology and Biotechnology "C. Darwin", Sapienza University of Rome, Piazzale A. Moro, 5, 00185 Rome, Italy.

* Corresponding author:

Dr. Monia Vadrucci

email: monia.vaadrucci@enea.it

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Abstract

Microorganisms often cause significant damage on historical objects. The archive or library materials as well as textile or leather artifacts suffer serious attacks that need appropriate care treatments. Several biocide processes have been implemented but often their application does not preserve the material of the good. The objective of this work is the disinfection through ionizing radiation of leather wallpaper from the museum building Palazzo Chigi in Ariccia (Rome, Italy). The controlled sterilization treatments were carried out using X-ray beams to eliminate the microorganisms present on the leather and maintaining unchanged the properties of the constituent material. Some fragments of decorated leather wallpaper, dating back to the 1700s, were irradiated with X-rays up to 5000 Gy. The amount of microorganisms was evaluated by microbiological analysis before and after X-ray irradiation treatments to identify the dose that inhibits the bacterial load. It will be shown how the results obtained by the application of different chemical-physical techniques (Scanning Electron Microscopy, Fourier Transform Infrared spectroscopy and Light Transmission Analysis) have helped in the evaluation of the impact of the X-rays on leather chemical and physical integrity.

Keywords: Leathers, Bio-deterioration, Antimicrobial, Cultural Heritage, X-ray.