

Disinfection and Consolidation of Archived Materials and Cultural Heritage Artefacts by Radiation Processing Techniques

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Degradation of organic and especially cellulose based heritage is caused by both endogenous and exogenous factors. One of the most common exogenous factor is moisture, and the variation of the equilibrium moisture content of the material can initiate the development of mold in the substrate. Mold not only affects cellulose materials, but is also impacts occupational health and thus should be rendered inactive as soon as possible. Doing nothing is not an option because active mold (even dormant) may deteriorate cellulose based heritage easily, while its wake-up call, i.e., an atmospheric moisture increase, can occur easily.

Much work has been performed on the application of γ -radiation and therefore it is well accepted in, e.g., the food industry and for medical device sterilization. However for cultural heritage application, discussions are still on-going as ionizing radiation may be capable of deteriorating organic materials. Compared to conventional disinfection with chemicals, γ -radiation can be seen as a clean disinfection method as no harmful volatiles are emitted after the treatment with full effectiveness on deteriorating the mold species.

In the past decade, many heritage science research programmes world-wide were dedicated to the application of ionizing radiation for disinfection and conservation. The research varied from optimization of the treatment to understanding of deterioration mechanisms, and in 2012 for the first time, an IAEA supported event was held in São Paulo, Brazil. The IAEA now supports a new research network dedicated to this topic aiming to solve final research gaps and produce well accepted recommendations.

This paper reviews not only the state-of-the-art of international developments on the application of ionizing radiation for cultural heritage for both disinfection and conservation, but includes a summary of show-cases. For example, the disinfection of the Library collection of the Peace Palace, the Hague (Netherlands) and conservation of a XVIIIth century parquet, Grenoble (France). Finally a novel book dedicated to the topic of this presentation, supported by the IAEA, shall be introduced.