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Radiation resistance of some microorganisms involved in cultural heritage artefacts degradation

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Ionizing radiation is used for decades in applications related to microbiological decontamination. Although the study of radiation resistance of microorganisms started many years ago, in practice, a number of aspects still need clarification. Some applications (like sterilization of medical devices) have a high degree of standardization, while for others the radiation resistance tests are required for each category of materials. One particular field, which requires careful evaluation of the radiation resistance of a contaminating population, is the irradiation treatment for disinfection of cultural heritage artifacts (paper, wood, textiles, leather – or complex combination of materials). Two aspects are hindering the wide standardization of the irradiation practices: the large variety of microorganisms encountered in various applications and the different radiation resistance reported for different environmental or growth conditions of microorganisms. In this study there are reported the experimental approaches for radiation resistance developed in the microbiological laboratory of IRASM department from IFIN-HH, Romania. Experimental results were obtained in two applications on current interest: standardization of the radiation resistance testing methods and irradiation treatment for cultural heritage preservation. Previous studies showed that microorganisms' resistance to ionizing radiations does not significantly varies with storage conditions (temperature and humidity) preceding the irradiation. Consequently, has been studied the radiation resistance of the same species of microorganisms isolated from cultural heritage artefacts of different types (paper and textiles) and different origins. The results aim to set the right treatment dose for the main decaying biological agent, in order to stop the attack. The issue of non-cultivable microorganisms is also discussed.

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