



Caratterizzazione su scala nanoscopica della rete fibrillare di collagene di beni archivistici e librari.

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Pergamena e cuoio

Il problema

Danno microbiologico

La disinfezione

Removable Electrons to X-rays (REX)



Le tecniche diagnostiche

Microscopia Elettronica a Scansione (SEM)

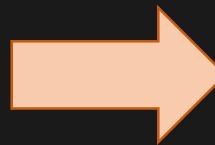
Microscopia a Forza Atomica (AFM)



Pergamena e cuoio



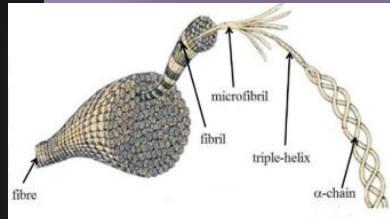
Deterioramento
di origine
microbiologica



DISINFEZIONE?



Trattamenti «umidi»



Fumigazione

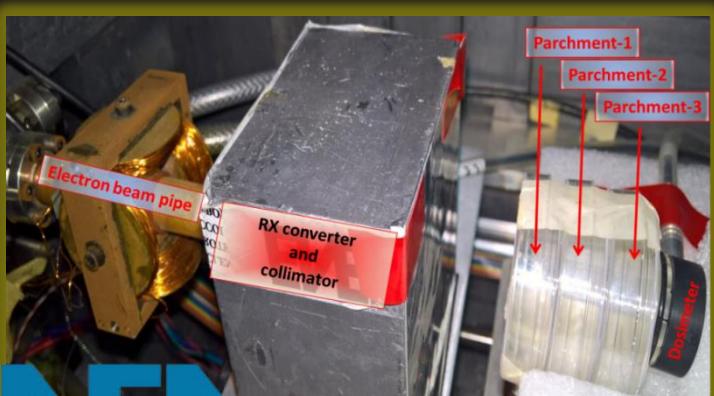
*...Radiazioni
ionizzanti*



*...Come
applicarle?*

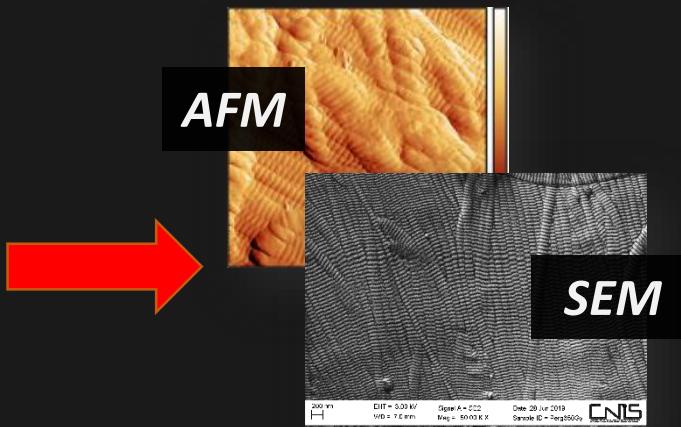
REX

Il REX (*Removable Electrons to X rays*) si basa su un acceleratore lineare di elettronni a 5 MeV in banda S, dotato di un convertitore di raggi X. La strumentazione può emettere radiazioni con intensità e fluenza modulabili per uno specifico scopo ed eseguire simultaneamente la dosimetria

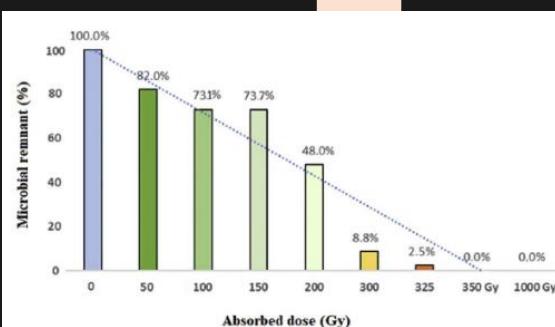


ENEA

**Valutazione
del rischio**

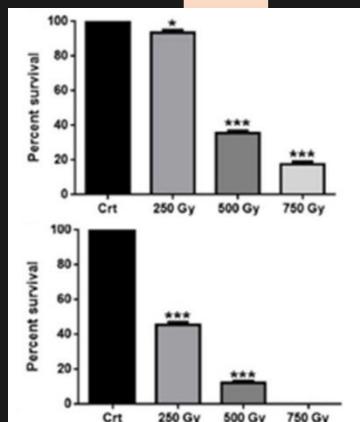


SEM



Perga

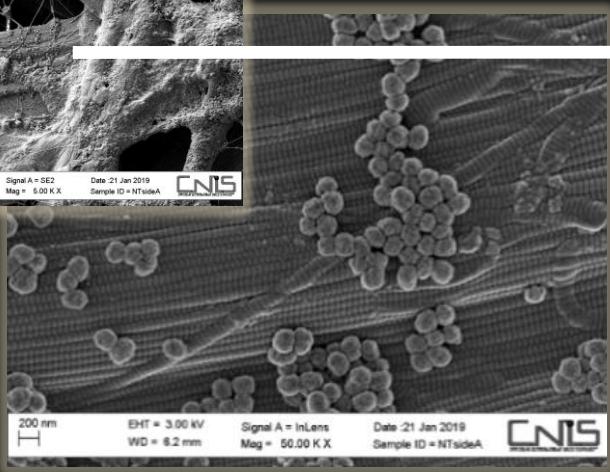
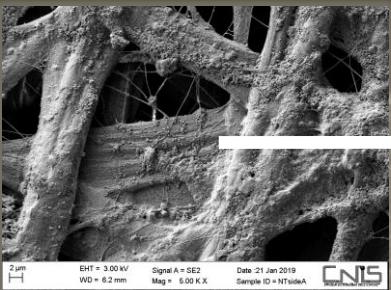
3000 Gy



B. cereus and *M. timonae* cells recovered after irradiation.

Cuo

5000 Gy

SEM

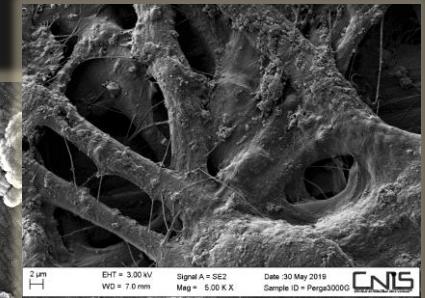
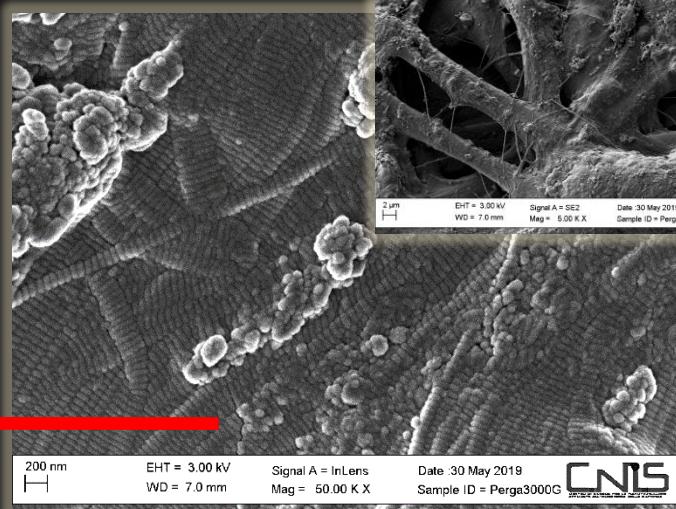
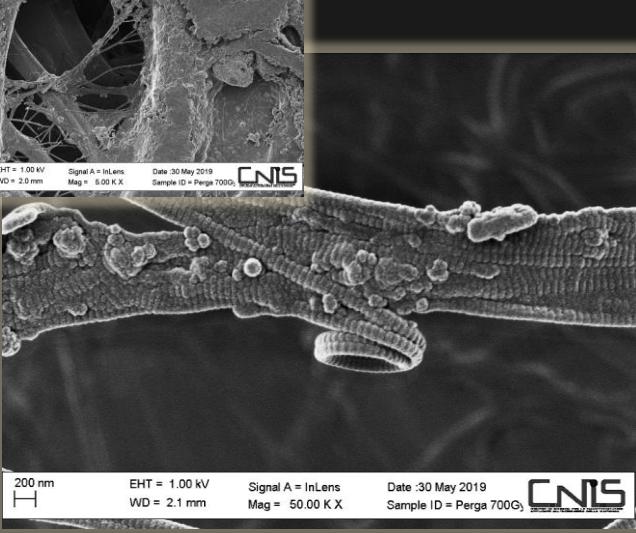
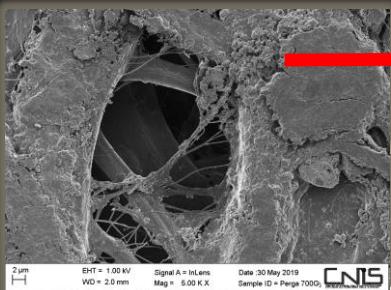
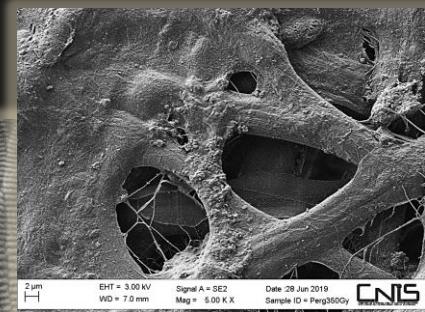
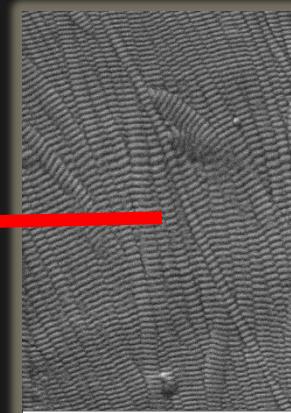
0 Gy

350 Gy

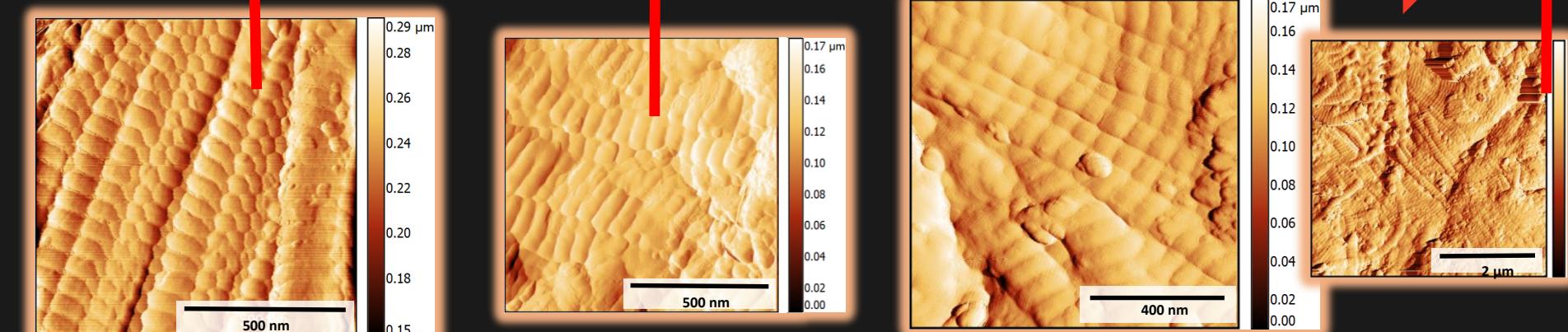
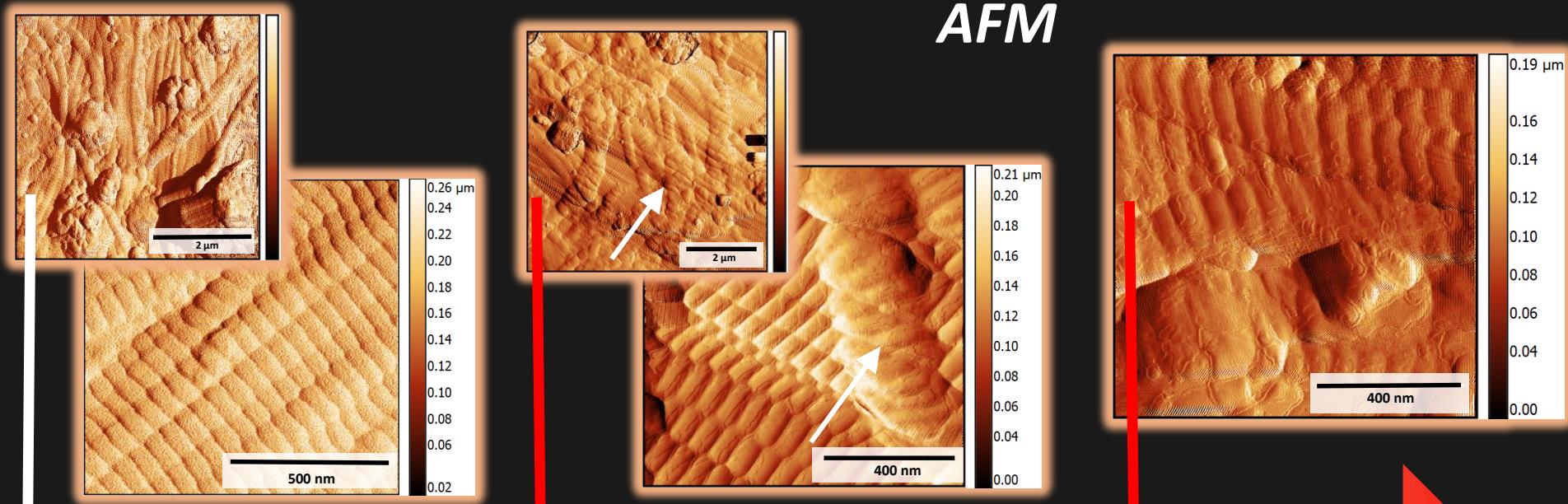
700 Gy

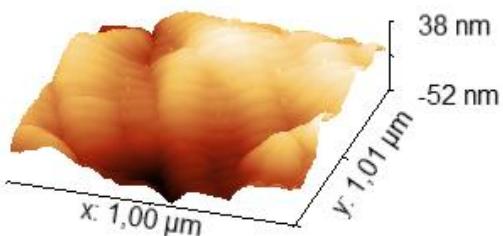
3000 Gy

Irradiament

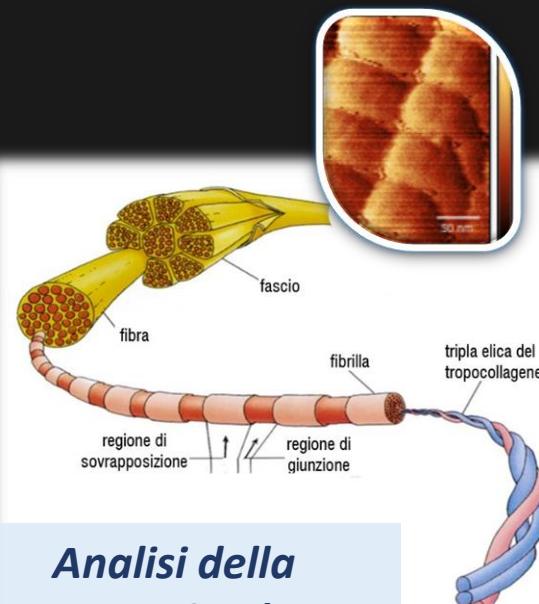


AFM

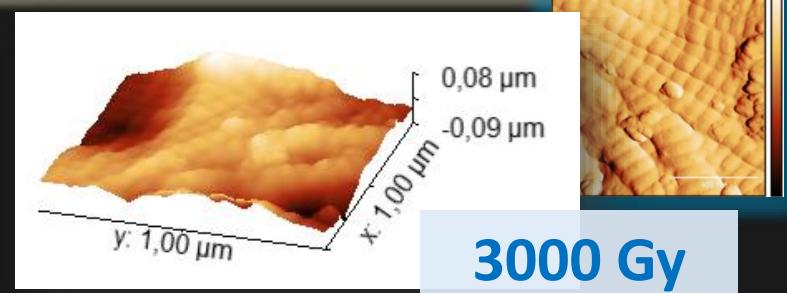
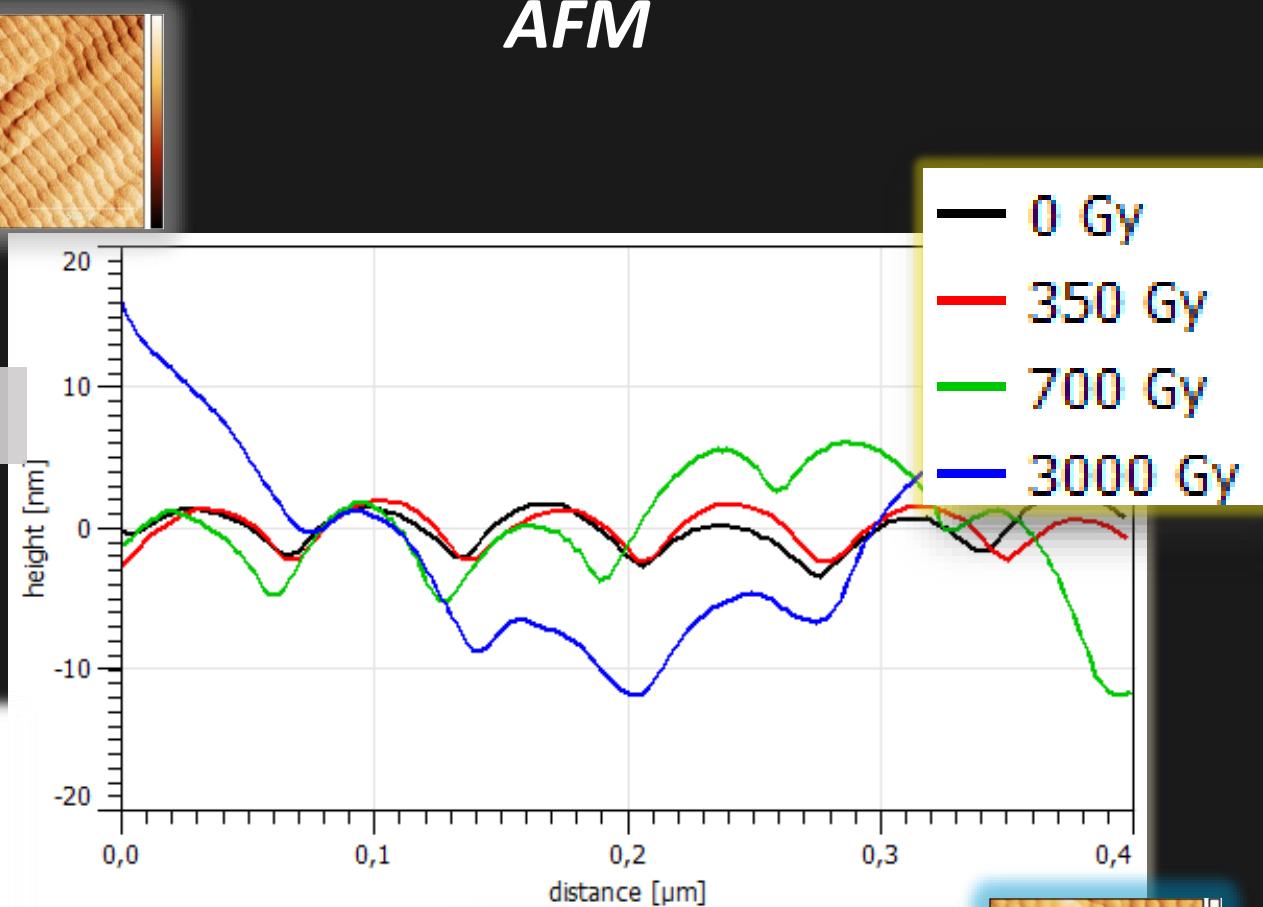


AFM

Non trattato (0 Gy)



**Analisi della
periodicità**

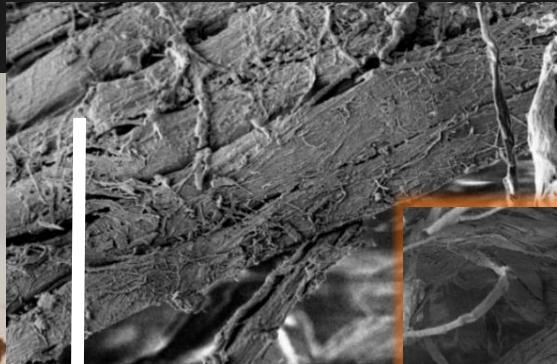


3000 Gy

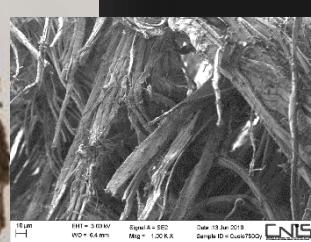
SEM



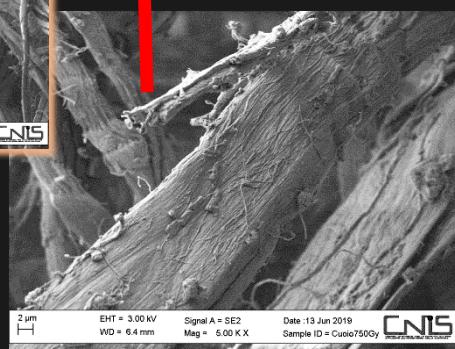
Frammento di cuoio
Palazzo Chigi in Ariccia
(Roma)



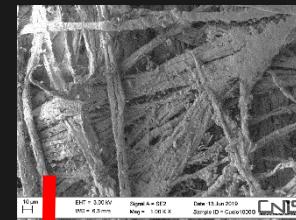
0 Gy



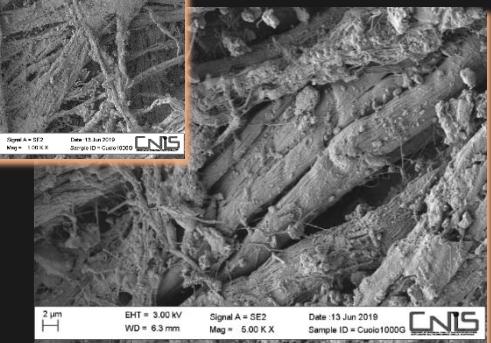
750 Gy



SEM

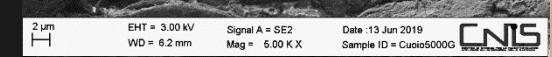


1000 Gy



5000 Gy

irraggiamento



Conclusioni e prospettive

Identificazione dose soglia

Caratterizzazione del danneggiamento

Valutazione dell'applicabilità del trattamento



Valutazione dell'efficacia della sterilizzazione su nuove colture di biodeteriogeno

*Confronto con altre tecniche diagnostiche
(FTIR-ATR, LTA, ...)*

Effetti dell'invecchiamento artificiale





ADAMO

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Grazie per l'attenzione

Per saperne di più...

M. Vadrucci, F. Borgognoni, C. Cicero, N. Perini, L. Migliore, F. Mercuri, N. Orazi, A. Rubechini, *Parchment processing and analysis: Ionizing radiation treatment by the REX source and multidisciplinary approach characterization*, *Applied Radiation and Isotopes* 149 (2019), 159–164.

M. Vadrucci, G. De Bellis, C. Mazzuca, F. Mercuri, F. Borgognoni, E. Schifano, D. Uccelletti, C. Cicero, *Effects of the Ionizing Radiation Disinfection Treatment on Historical Leather*, *Frontiers in Materials* 7 (2020), 21.

M. Vadrucci, C. Cicero, P. Parisse, L. Casalis, G. De Bellis, *Surface evaluation of the effect of X-rays irradiation on parchment artefacts through AFM and SEM*, *Applied Surface Science* 513 (2020), 145881.

M. Vadrucci, C. Cicero, F. Borgognoni, G. Ceres, N. Perini, L. Migliore, F. Mercuri, N. Orazi, S. Paoloni, A. Rubechini, *Parchment disinfection treatment by ionizing radiation*, 2018 *Metrology for Archaeology and Cultural Heritage* (MetroArchaeo), Cassino FR, Italy, 2018, pp. 367-372, doi: 10.1109/MetroArchaeo43810.2018.9089774.