

AVVISO DI SEMINARIO

*Lunedì 21 Maggio alle ore 15:00
in aula Seminari del
Dipartimento di Scienze e Tecnologie Chimiche, la*

Mauro Missori

Istituto dei Sistemi Complessi, CNR, Unità Sapienza, Rome, Italy

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Terranno un seminario dal titolo:

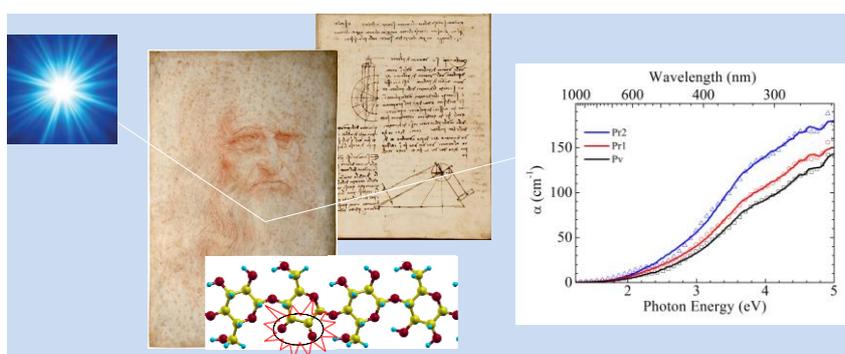
**Experimental and theoretical UV/Vis-IR-THz spectroscopy
for diagnostic studies of ancient paper**

Proponenti: Prof. Laura Micheli, Dr Claudia Mazzuca

Abstract

Paper plays a crucial role in human technology and in dissemination of human knowledge. During the centuries, it has been the most widely used writing support and therefore paper degradation is a major issue for cultural heritage. The main component of paper is cellulose, one of the most abundant biomaterials on Earth. Cellulose oxidation is mainly responsible for the yellowing of the ancient samples, through the formation of optically active oxidized functional groups (chromophores). In order to investigate this issue we applied several experimental spectroscopic techniques (UV/Vis-IR-THz) interpreted by *ab-initio* theoretical computational simulations based on Density Functional theory (DFT) and Time-Dependent DFT (TDDFT) methods.

In this talk, we illustrate the cited experimental and theoretical methods and show their application to several modern and ancient paper samples. We show how to transform UV/Vis reflectance spectra of ancient samples into absorption spectra of cellulose fibers by using an improved version of the Kubelka-Munk theory for inhomogeneous and strongly absorbing media. The procedure based on UV/Vis spectroscopy is particularly promising since it is based on non-invasive and non-destructive measurements, which can be performed *in-situ*, allowing a diagnostic analysis of fragile ancient paper artifacts. We present interesting results on the state of degradation of the Leonardo Da Vinci's drawings including the famous self-portrait as well as other famous works of art on paper.



A. Mosca Conte, O. Pulci, M. C. Misiti, J. Łojewska, L. Teodonio, C. Violante and M. Missori “Visual degradation in Leonardo da Vinci’s iconic self-portrait: A nanoscale study” *Appl. Phys. Lett.* 104, 224101-4 (2014).

M Peccianti, R Fastampa, AM Conte, O Pulci, C Violante, J Łojewska, M Clerici, R Morandotti, M Missori “Terahertz absorption by cellulose: Application to ancient paper artifacts” *Physical Review Applied* 7 (6), 064019 (2017).

L Micheli, C Mazzuca, M Missori, L Teodonio, A Mosca Conte, O Pulci, L Arcadipane, S Dominijanni, A Palleschi, G Palleschi, S Iannuccelli, S Sotgiu, “Interdisciplinary approach to develop a disposable real time monitoring tool for the cleaning of graphic artworks. Application on “le Nozze di Psiche”, *Microchemical Journal* 138, 369-378 (2018).