

Title and Abstract of the seminar:

Modelling the degradation of colors in paintings: any chance?

Abstract

Several of the historical coloured pigments belonging to the paintings of the late 1800 and early 1900, are undergoing an irreversible degradation process, causes of which are still unclear. In the specific case of the brilliant yellow pigment that takes its colouration from cadmium sulfide (CdS), a II-VI wide-gap semiconducting compound, the role of structural defects is the subject of a research that aims to link the history of the material to the reactivity of the pigment surface.

The study is carried out by means of a fully theoretical approach based on the density functional theory. As opposite to the investigations on novel materials, in the field of Cultural Heritage - where pigments already possess their long history - a theoretical method becomes secondary to the experimental analysis. Yet, it represents an excellent complementary tool useful in the interpretation of complex mechanisms not easily accessible by experiments. The interdisciplinary work takes advantage of various chemical and physical skills, both experimental and theoretical.

Brief CV:

Alessandra Satta focuses, at present, in the application of computational physics techniques to the study of materials significant in the field of Cultural Heritage: solid compounds constituting the coloured pigments in the paintings of the European Impressionist and Modernist period (late 1800 early 1900).

Her long-time experience in theoretical modelling of the electronic structure of materials relevant in microelectronics and the study of diffusion of structural defects in both metals and semiconductors has been instrumental in the opening of this new research area.

AS obtained both a degree (Summa cum Laude) and a PhD in Physics (1996) at the University of Cagliari, Italy. She began her scientific activity with a short internship at IRRMA-EPFL, Switzerland (1991) studying the theoretical-computational study of both metallic and semiconducting systems containing point and/or extended defects.

She received post-doctoral appointments at CEA/Saclay, France (1996-1998), the Dpt. of Physics of the University of Cagliari (1998-2000), the INFN-Cagliari (2000-2002 and 2004-2009), the CNR-IMM, Bologna (2003-2004), and was awarded Fulbright research scholarship that allowed her to start working on calcite/environment interface at the Department of Chemistry of the University of Princeton, USA (2008).

Dr. Satta has been an Adjunct Professor of General Physics I for the University of Cagliari at the Department of Geoengineering and Environmental Technologies from 2003-2008 and taught Fundamentals of Computer Science at the Department of Physics (2010-12). She has taught electronic structure in solid state physics from 2013-14 in training courses for high school teachers, served as a PhD thesis supervisor and co-supervisor of graduating theses at the University of Cagliari.

From 2010 to March 2018, she has been in charge of the Cagliari unit of the CNR-IOM.

Dr. Satta has been a Visiting Scientist at the Department of Physics of the University of North Texas, USA (February-March 2018 and October-December 2018) to apply new theoretical functionals developed by the hosting group, to the study of semiconducting pigments.