



Consiglio Nazionale delle Ricerche

Venerdì, 12/03/2021

alle ore 11.30

la **Dr. Sandra Doria**

CNR-ICCOM

Firenze

terrà il seguente seminario:

""Energy flow in complex molecular systems""

Il seminario sarà tenuto in modalità telematica, tramite accesso alla piattaforma:  
GoToMeeting

Si invitano tutti gli interessati a partecipare.

**Dr. Francesco Vizza**  
Direttore ICCOM

## Short Abstract:

One of the most challenging goals of recent research is the achievement of efficient conversion of sunlight into electricity, in order to fulfill the worldwide increasing demand for energy. The interest of many research groups is addressed toward the realization of artificial light-harvesting antennae, mainly based on organic molecules that take part in important biological processes, including photosynthesis. Within this context, the characterization of energy and charge transfer processes occurring in organic systems is a crucial point. The complexity of the subject is connected to the identification of the micro-scale phenomena that occur after visible excitation of the systems. The goal is to control these processes in order to maximize the energy migration throughout the systems, aiming to their potential application in organic photovoltaic devices. Stationary and time-resolved spectroscopic techniques are excellent experimental methods to investigate ET in organic molecular complexes, because the electronic properties are revealed in the absorption and emission spectra. The characterization of the spectral features and their time evolution, on microsecond timescale, gives important pieces of information about the nature and dynamics of the excited state, and its interaction with the surrounding. In special cases aggregation phenomena can have a major role in the definition of transport properties of materials, and the investigation of their excitonic behavior and of the role of energetic disorder opens a large number of scientific challenges.

## Biographic sketch:

I took my bachelor degree in Physics and master degree (2013) in Physics of Matter at the University of Rome "La Sapienza". My first research experience in the field of material science dated back to 2012, when I spent seven months in the imaging functionality group at the Center For Nanophase and Material Science (CNMS), Oak Ridge National Laboratory (ORNL), Tennessee, US. There I carried out the experimental work for my master thesis, consisting in the electrochemical investigation of thin films for Micro-Solid Oxide Fuel Cells (SOFCs) applications, through Atomic Force Microscopy (AFM) and Electrochemical Strain Microscopy (ESM).

I moved to Florence for my PhD in the Ultrafast group at the European laboratory For Non Linear Spectroscopy (LENS), where I became familiar with time-resolved spectroscopic techniques such as Transient Absorption Spectroscopy (TAS) and 2D visible electronic spectroscopy (2DES). I was mainly focused on the study of electron migration and energy transfer mechanisms in bichromophoric units for energetic applications, such as Bodipy and Phtalocyanine compounds.

I spent one year of my PhD in the Bawendi group at Massachusetts Institute of Technology (MIT, Chemistry dept.), where I dealt with aggregation phenomena in cyanine-based light-harvesting nanotubes. I performed experiments of linear spectroscopy and fluorescence lifetime at cryogenic temperatures to get insight the excitonic behavior and superradiance phenomena.

After my PhD (2017) I experienced a moment of discontinuity in my educational course, and I attended three years of Specialization School in Medical Physics at the Careggi University Hospital (University of Florence). During this period I was involved in a newborn research project about artificial intelligence algorithms for diagnostic image processing. I spent 5 months at the Italian Institute of Technology in Genova to acquire know-how in the field of machine learning for medical imaging, which was the topic of my specialization thesis.

In 2020 I was employed at ICCOM-CNR and I joined my old group at LENS focused on the chemical physics research in the field of photoswitch materials, dyes and J-aggregates for light-harvesting and photodynamic therapy applications.

I'm currently involved also in the medical physics research and recently an official agreement between ICCOM-CNR and Careggi established their common participation in the research project "Artificial Intelligence for the optimization of Computer Tomography Protocols", that includes several Italian institutions.