

Venerdì, 11/06/2021

alle ore 11:30

il Dr. **Samuele Fanetti**

ICCOM-CNR

Firenze

terrà il seguente seminario:

**"High Pressure: a tool to make chemistry and discover new materials"**

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:

High pressure is a powerful tool for the synthesis of new exotic materials characterized by interesting electronic and mechanical properties, such as extreme hardness or superconductivity.

The main effect of pressure on the molecular materials is a marked reduction of the molar volume, that consists in a strong increase of the density of the material itself, an increase that cannot be realized acting on any other thermodynamic parameter. At the high density that can be reached already in the 10-100 GPa pressure range (1 GPa  $\sim 10^4$  atm), the molecules are put so close that the intermolecular interactions become as strong as to compete with the intramolecular ones, resulting in changes in the physics and chemistry of the system. The changes can be so deep that the molecular identity can be lost, as a consequence of a reorganization of the chemical bonds: new materials can be produced due to amorphization, metallization and peculiar reaction paths that can be induced only with the aid of the high density experimented at high pressure.

In this talk I will introduce few examples of the effect of pressure on molecular materials. I will show how the high pressure affects the physical and chemical properties of molecular materials, and some interesting cases of new materials with interesting technological properties that can be produced taking advantage of the high pressure induced reactivity.

## Biographic sketch:

I took my Bachelor Degree in Chemistry at the University of Florence, discussing a thesis on the study of the electronic properties of benzene crystal at high pressure. In 2010 I took my Master Degree in Chemical Science at the University of Florence, discussing a thesis on the high pressure photoinduced reactivity on water and simple alcohols. I took my PhD in 2014 in Atomic and Molecular Spectroscopy, discussing a thesis on the structure and reactivity of model molecules under pressure studied by non-linear spectroscopy. Since then I was part of the High Pressure Chemistry and Physics group at LENS, the European Laboratory for Non Linear Spectroscopy, in Florence. I spent six years as a postdoctoral fellow (3 years at the Chemistry department of the University of Florence, 1 year at LENS and 2 years at ICCOM-CNR) and then, in 2019, I was employed at ICCOM-CNR as a permanent researcher.

My main scientific field is the chemistry and physics of molecular materials at high pressure, studied by a variety of linear and non linear spectroscopic optical techniques, by time resolved spectroscopy and by X-ray diffraction, all of them performed in a diamond anvil cell. The main aim of this kind of study is the comprehension of the phenomena that are induced by pressure and the rationalization of the reaction mechanisms that are at the base of the synthesis of new materials with promising technological properties. This fundamental knowledge is employed to lower the pressure threshold needed to obtain the desirable materials to conditions that are reliable from a technological/industrial point of view (...think about synthetic diamonds!).