Istituto di Chimica dei Composti Organometallici

ICCOM Pisa incontra ICCOM Firenze

Venerdì 5 Aprile 2019
Alle ore 11:00

presso Aula 27, Edificio A –Piano terra
Area della Ricerca CNR, Via Moruzzi 1 - Pisa

Il Dott. Matteo Ceppatelli di ICCOM-Firenze terrà il seguente seminario:

"Chemistry under extreme pressure conditions"

Dr. Francesco Vizza
ICCOM-CNR

Abstract:

During the last 20 years high pressure science has experienced a dramatic growth and nowadays encompasses a huge variety of research areas, spanning from biology and food processing to chemistry and physics of matter under extremes conditions. In this presentation, after a brief introduction about the generation of static high pressure in the GPa range and the effect of pressure on molecular systems, I will present a selection of significant studies, which highlight the importance of pressure not only to explore the fundamental chemical and physical properties of matter, but also to synthesize new advanced materials and gain insight about their structural and reactive properties. I will finally focus on our recent results about the mechanism of the high pressure A7 to sc phase transition in Phosphorus and the discovery of the pseudo-simple cubic (p-sc) structure, which has remarkable implications, as it significantly raises the pressure limit where the layered structures of P exist and reconciles the chemical and structural high pressure behavior of P with those of heavier pnictogens, finally bringing order to the sequence of the high pressure limit for the layered A7 structure in group 15 elements of the periodic table. The identification of the effects ruling the stability of the layered vs non-layered structure of P possibly opens new perspectives for the synthesis, stabilization and functionalization of Phosphorene-based materials. Finally, as superconductivity is concerned, the identification of the p-sc structure provides new experimental evidence to explain the long-debated anomalous pressure evolution of Tc in P below 30 GPa.

Biographic sketch:

Matteo Ceppatelli graduated in Chemistry at the University of Florence in 1999 with a thesis about the study of the pressure induced polymerization in the acetylene crystal by means of FTIR spectroscopy. In 2003 he received a PhD in Chemical Sciences at the University of Florence discussing a thesis entitled “Spectroscopic study of the pressure induced chemical reactivity in diamond anvil cell”. As a postdoc, he became a member of the high pressure chemistry and physics group at the European Laboratory for Non-Linear Spectroscopy (LENS). Since 2011 Matteo Ceppatelli is researcher at the Institute of Chemistry of OrganoMetallic Compounds of the National Reaserch Council of Italy in Sesto Fiorentino. His experimental research activity is mainly focused on the study of the structural and reactive properties of matter under extreme pressure (1-100 GPa) and temperature (10-2500 K) conditions using Diamond Anvil Cells (DAC) in combination with spectroscopic (FTIR, Raman, UV-VIS) and X-ray diffraction techniques. His interests cover fundamental issues as well as energetic and technological systems. Matteo Ceppatelli is author of 50 publications (2 reviews) with 960 citations and h-index 19. He has more than 30 oral and poster presentations to international conferences, including several invited talks and one keynote lecture, and more than 30 contributions presented by others. He is main author and proposer of numerous approved proposals for experiments at high pressure beamlines of international synchrotron facilities (ESRF, DESY) and has collaborations with groups in France, Spain and Germany. He participated in several national and international projects. At the moment he is the scientific responsible for work package 2b of Phosfun ERC Advanced Grant (PI Maurizio Peruzzini) and he is coordinating two postdocs to study the high pressure behavior of the layered structures of Phosphorus and their reactivity with small simple molecules. His activity includes co-supervising master and bachelor degree thesis in Chemistry at the University of Florence, postdoc tutoring and scientific culture dissemination.