

Venerdì, 02/07/2021
alle ore 11.30

la **Dr.ssa GIULIA TUCI**
ICCOM-CNR
Firenze

terrà il seguente seminario:

**"Surface Engineering of Carbon Nanomaterials: a
Rational Design of Sustainable Systems for Promoting
Key Heterogeneous Catalytic Processes "**

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:

Heterogeneous catalysis represents a powerful tool for the efficient and sustainable promotion of chemical transformations spanning from industrial production of chemicals and feedstocks to key processes at the heart of renewable energy technology. The catalytic systems of choice are represented by metal-based systems that, however, pose several concerns about their sustainability both from an economic and environmental view-point. In particular, Platinum-Group Metals (PGMs) often offer remarkable catalytic activity but their high cost and low abundance largely hamper their exploitation on large scale. Moreover, they are included in the 2020 European Union list of Critical Raw Materials because of the risk associated to their supply also due to delicate international equilibria. For these reasons, the development of cheaper and more easily available alternative materials to promote key catalytic processes is an urgent matter to be faced by our modern society. On this ground, hetero-doped carbon nanomaterials were found to be promising alternatives able to replace noble metals in many (electro)catalytic processes with comparable and to some extent better performance. However, several aspects remain critical in this field and have to be properly addressed for promoting their widespread diffusion. The main critical point is related to the lack of comprehension of their structure-reactivity relationship that largely hinders the comprehension of the underlying reaction mechanism and the possibility to rationally design materials with improved performance. My research activity aims at overcoming these limits through a conceptually new synthetic approach based on the exohedral chemical functionalization of complex carbon nanomaterials that allows to finely control the chemico-physical properties of surface active sites hence unambiguously attributing their role in the catalytic processes under investigation. In this seminar I will show you that playing with complex carbon nanostructures and tuning their surface properties provide metal-free materials with unique catalytic properties while offering a privileged view-point on the reaction mechanism. The exploitation of these innovative metal-free materials in two electrocatalytic processes at the heart of renewable energy technology (*i.e.* O₂ and CO₂ electrochemical reduction) will be discussed.

Short Biography:

Giulia Tuci received her Master Degree in Chemistry cum laude at University of Pisa in 2010 and her PhD in Chemical Science in 2015 at University of Florence. Since 2011 she works at ICCOM-CNR in Florence in the "Nanomaterials & Catalysis Group" led by Dr. Giuliano Giambastiani where, since 2018, she holds a permanent position. Her research activity is mainly focused on the design and synthesis of innovative metal-free carbon-based materials for application in several field of heterogeneous catalysis spanning from processes for renewable energy technology to CO₂ valorization, environmental protection and industrial production. Recently her research activity has been widened also to the use of doped carbon materials as non-innocent supports for non-noble metals based catalysts and to the development of new strategies for chemical functionalization of Transition Metal Dichalcogenides for the design of tailored catalytic materials for application in sustainable processes. In 2018 she received the "Junior EnerCHEM" award from the Italian Chemical Society for her significant scientific contribution in the field of Renewable Energy and in 2020 the "*Premio alla Ricerca Chimica Organica per l'Ambiente, l'Energia e le Nanoscienze Junior*" from the Organic Chemistry Division of the Italian Chemical Society for the outstanding scientific results achieved in the field of "*Chemistry for Environment, Energy and Nanoscience*". She presented her research activity in more than 20 National and International Congresses including two Invited contributions and she is author and co-author of 70 publications in high-impact peer-reviewed journals (h-index = 19).