# Avviso di Seminario

## Dr. Gianluca Milano, Dr. Federico Ferrarese Lupi

Istituto Nazionale della Ricerca Metrologica (INRiM)

Metrologia dei materiali innovativi e scienze della vita

## Artificial intelligence for the discovery of novel materials: a case study based on self-assembling block copolymers

**Tuesday, 12 January 2020, h. 16.00**

**Webex virtual room**

https://unito.webex.com/unito/j.php?MTID=ma88a947a4324b019c9339876958f8794

## Abstract

The evolution of artificial intelligence, closely related to the rapid development of machine learning (ML) algorithms, has revolutionized numerous industrial and technological fields by enabling the analysis and processing of a large amount of data. Clear examples of the use of artificial intelligence are represented by face-recognition systems, self-driving cars and personalized medicine.

In recent years, scientific community has extensively explored the potential of ML algorithms. In particular, in the field of nanotechnologies, ML algorithms represent a valid tool for the optimization and implementation of experiments useful for the development novel materials [1,2].

The main goal of this seminar is to introduce some basic concepts related to artificial intelligence, that can be exploited for the realization of innovative self-assembling materials (e.g. block copolymers and colloidal nanospheres). In particular, the implementation of artificial neural networks enables to create neuromorphic systems able to analyze vast datasets of synthesis experiments, learn from their results and predict the characteristics of novel self-assembling materials with different synthesis parameters.

The possibility of carrying out a thesis related to this topic at the Istituto Nazionale di Ricerca Metrologica (INRiM) will also be discussed.

[1] Brown, Keith A., et al. "Machine Learning in Nanoscience: Big Data at Small Scales." Nano Letters 20.1 (2019): 2-10.

[2] Sha, Wuxin, et al. "Artificial Intelligence to Power the Future of Materials Science and Engineering." Advanced Intelligent Systems 2.4 (2020): 1900143.

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## Speakers:

Dr. **Gianluca Milano** is permanent researcher at INRiM, Division Advanced Materials and Life Science. After a master degree in Physics from University of Torino, he obtained a PhD in Physics cum laude from Politecnico of Torino in collaboration with the Italian Institute of Technology (IIT) working on the realization of memristive devices based on nanostructured materials. He spent a visiting research period at RWTH Aachen University (Germany) working on the investigation of the resistive switching mechanism underlying memristive behavior and neuromorphic functionalities in nanowires. His current research interests focus on the realization of electronic and memristive devices based on nanostructures, from material synthesis to device characterization and metrology, quantized conductance effects, neuromorphic computing and artificial intelligence.

Dr. **Federico Ferrarese Lupi** is permanent researcher at INRiM, Division Advanced Materials and Life Science Metrology. During the PhD at University of Barcelona his main research activity was focused on the optical characterization of Silicon-based materials with potential application as optical amplifiers, lasers and sensors. He worked at CNR-IMM, MDM Laboratory as post-Doc for three years on the fabrication and characterization of self-assembling nanostructured materials (i.e. block copolymers and colloidal nanospheres). He is author/co-author of more than 55 papers in international scientific journals.