DIPARTIMENTO DI SCIENZE MATEMATICHE E INFORMATICHE, SCIENZE FISICHE E SCIENZE DELLA TERRA
Dottorato di Ricerca in Fisica

Appunti di Fisica '21

4 marzo ore 15:30

webinar su Microsoft Teams

Correlating topography and elastic properties of Elastin-Like Polypeptide scaffolds probed at the nanoscale using Intermodulation-AFM

Nisha Rani Agarwal
(Nano-imaging and Spectroscopy Laboratory, University of Ontario Institute of Technology, Oshawa, Canada)

Most phenomena or interactions whether they be physical, chemical or biological in nature take place at the nanoscale. Hence, materials under study should be characterized for various properties such as structural, mechanical, optical and chemical at high resolution. Not many techniques are capable of nanoscale measurements. Development of novel techniques for this purpose is possible by employing recent advances in technology. One such advancement is the development of Multifrequency Lock-in Amplifier (MLA) that outperforms conventional lock-in amplifiers in many ways. This MLA is able to simultaneously detect more than 20 close by frequencies with no interference from each other. Thus, making it possible for incorporating MLA to develop new techniques.

In my talk, a novel method has been developed in order to measure the elastic property in combination with structural property at the nanoscale which is achieved by intermodulation Atomic Force Microscopy (AFM) while driving the tip at two frequencies. This results in generation of other frequencies from which the force curve can be reconstructed to be fitted with various force models in order to extract the elastic values. A very important consideration to be made is that the handling of force curves and data processing not only depends on the surface properties of the sample but also depends on the morphology of the samples and on the tip properties. ImAFM is particularly of interest for measuring visco-elastic properties i.e probing nanoscale properties of biomaterials.