Advanced high-resolution microscopies for the characterization of scaffolds, gels and engineered tissues

Simone DINARELLI – *CNR, Rome*

Nowadays there is a plethora of bio-related materials and bio-engineered systems. These research fields are continuously growing in interest and are attracting researchers from various disciplines, such as chemists, physicists, medical doctors and biologists. These bio-inspired and bio-compatible materials grant unique capabilities that can mimic the real “live” system while increasing the performance of the biological specimens, such as, for example, growth rate in tissue regeneration or precise targeted delivery of drugs. When interacting with biological specimen, these bio-engineered objects need precise properties in terms of spatial dimensions, local and overall elasticity, surface roughness and chemical functionalization. These parameters “de facto” guide the cellular response and can improve the required outcome, a typical experimental workflow usually imply the fine tuning of these parameters in order to optimize the cellular-material interaction. High resolution techniques are required to track record and accurately measure on the micro- and nanoscale the bio-material properties, considering that these can be really different with respect to the ones measured on the bulk material. In this talk we will discuss the recent improvements of some of the most used and promising techniques such as Atomic Force Microscopy and X-Ray tomography focusing on how they can be successfully employed in the characterization of three-dimensional scaffolds, hydrogels, nanogels and engineered tissues.