ROMA TRE
UNIVERSITÀ DEGLI STUDI

Dipartimento di Scienze
Viale Guglielmo Marconi, 446 - 00146 Roma - www.uniroma3.it

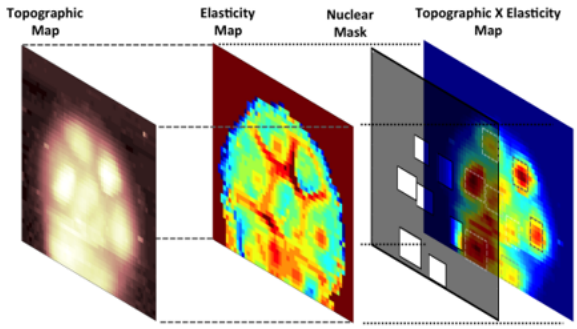
STUDYING MECHANICAL AND ADHESIVE INTERACTIONS IN BIOLOGICAL SYSTEMS WITH THE ATOMIC FORCE MICROSCOPE

Alessandro Podestà
Dipartimento di Fisica and C.I.Ma.I.Na, Università degli Studi di Milano, IT

Martedì 5 Luglio 2022 ore 15:00 – Piattaforma TEAMS
(short-link: https://bit.ly/3y4uE2m)

info: antonio.benedetto@uniroma3.it; armida.sodo@uniroma3.it

The role of forces is fundamental in several biological processes. Cells can perceive physical stimuli from the surrounding microenvironment (the extracellular matrix, ECM) through extremely complex processes mediated by several different molecular machineries. Unravelling which peculiar properties of the ECM determine specific cellular responses, understanding the mechano-sensing processes and how cells in turn modify the physical state of the microenvironment in relation to changes of the physio-pathological state of the tissue, could help elaborating diagnostic approaches based on mechanical quantitative nanoscale measurements. Here we describe techniques based on Atomic Force Microscopy (AFM) for the characterization of structural and mechanical properties of cells, tissues, biomembranes and their interactions with the microenvironment. These approaches include nanomechanical (nano- and microindentation) as well as adhesion force spectroscopy measurements. The capability of AFM to investigate systems of biological and clinical relevance is demonstrated through some examples takes from recent studies, including the interaction of ionic liquids with cells and model biomembranes, the cellular mechanosensing of nanotopographical features of the ECM, and the modification of the rigidity of colon and peritoneum ECMs induced by cancer progression.



[1] Puricelli L. et al., Nanomechanical and topographical imaging of living cells by atomic force microscopy with colloidal probes. Review of Scientific Instruments 86, 033705 (2015); https://doi.org/10.1063/1.4915896.
[2] Chighizola, M., Puricelli, L., Bellon, L. & Podestà, A. Large colloidal probes for atomic force microscopy: Fabrication and calibration issues. J. Mol. Recognit. (2020) https://doi.org/10.1002/jmr.2879.
[3] Galluzzi M. et al. Interaction of imidazolium-based room-temperature ionic liquids with DOPC phospholipid monolayers: Electrochemical study. Langmuir 29 (2013) 6573-6581. https://doi.org/10.1021/la400923d.
[4] Galluzzi M. et al. Imidazolium-Based Ionic Liquids Affect Morphology and Rigidity of Living Cells: An Atomic Force Microscopy Study. Langmuir 2018, 34, 41, 12452–12462. https://doi.org/10.1021/acs.langmuir.8b01554.

TEAMS extended link:
https://teams.microsoft.com/l/meetup-join/19%3a8f9ec19800e7467ab9bae6e627dfcb21%40thread.tacv2/1648139348412?context=%7b%22Tid%22%3a%22ffb4df68-f464-458c-a546-00fb3af66f6a%22%2c%22Oid%22%3a%2234c00d0e-4085-4def-be95-f11f6239bc3d%22%7d