

NOVEL METHODS AND ADVANCES IN BIO-MATERIAL TESTING

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Introduction

In recent decades, the rapid development of biophysical techniques has become crucial for the study of biological materials at the molecular level. Such techniques include, but are not limited to, bio atomic force microscopy (bioAFM), AFM-IR [1] spectroscopy, nanoindentation and scanning electron microscopy (SEM). These methods not only allow the study of the properties of biological materials, but also help in the development of new technologies and techniques for biomedical research.

BioAFM is a technique that allows the visualization and measurement of molecular structures of biological samples with high resolution and sensitivity with the possibility of correlation with advanced optical methods (STED, STEM, confocal, etc.). AFM-IR spectroscopy then allows correlative measurement of mechanical properties and chemical composition of samples with sub-10nm chemical resolution. Nanoindentation is a technique that allows the measurement of mechanical properties of biological materials, such as hardness and elasticity. SEM allows high resolution images of the surfaces of biological samples to be obtained with the possibility of combining with other analytical techniques.

The presentation will present the theoretical principles and mainly examples of the use of these techniques in biophysical research. Microscopy techniques can be used in the analysis of cells, protein structures, lipid membranes, viruses or cell-cell interactions. Nanoindentation can be used to measure mechanical properties of cells and tissues. SEM enables the acquisition of detailed images of cell surfaces and membranes, allowing the study of cell morphology and surface properties. Combinations of the above (and other) techniques are also possible.

Literature

- [1] J. Mathurin, A. Deniset-Besseau, D. Bazin, E. Dartois, M. Wagner, A. Dazzi, J. Appl. Phys. **131**, 010901 (2022).