Università degli Studi di Trieste

Dipartimento di Fisica

Seminario

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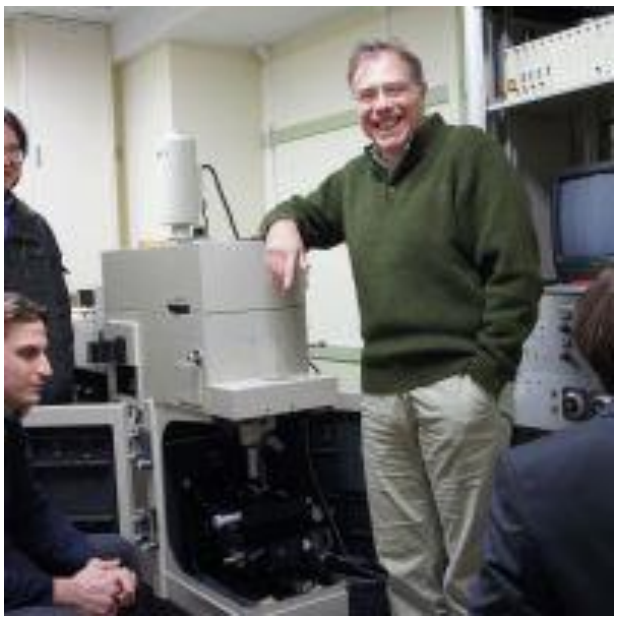
December 17, 3.00 PM - Lecture room B, F building, Dip. di Fisica - via Valerio, 2 – Trieste

Raman spectroscopy of biomaterials



Raman spectroscopy possesses enormous potentiality for unfolding basic and applicative issues in biomaterials science with both large economic benefits and promising developments into preventive healthcare. The Raman method comprehensively suites a number of technological needs for spatially resolved and quantitative assessments of crystal structures, domain textures, crystallographic alignments, and mechanical stresses in synthetic and natural biomaterials. However, the physics underlying the Raman effect represents an issue of deep complexity and, in a yet conspicuous lack of working algorithms, its applicative development to biomaterial structures can be considered in its infancy. This review paper starts from basic issues with revisiting some applicative aspects of the physics governing the Raman emission in both synthetic and natural biomaterials. The main aim of the paper is to explore the possibility of disentangling the convoluted dependences of Raman spectra on crystal orientation, chemical and stoichiometric alterations, and mechanical stress. Working algorithms are newly put forward in an explicit form, in order to quantitatively extract structural, chemical, and mechanical information from experimentally collected confocal/polarized Raman spectra. In the second part of the review, systematic characterizations of biomaterials and biomedical devices are presented as explicit applications of the developed equations according to a unified formalism. Statistical descriptions of crystallographic textures, based on orientation distribution functions, are also brought from theory to an expanded applicative level. They provide an effective link between the intrinsic vibrational behavior of single-crystals and experimental data collected on real polycrystalline (textured) structures. From a more general perspective, this review paper aims at providing rigorous spectroscopic foundations and working pathways to the analysis of healthy and diseased biogenic tissues, and to the rationalization of both functional behavior and structural reliability of the synthetic components of biomedical devices.

Organizzazione a cura di: F. Parmigiani, E. Vesselli

dipartimento di TRIESTE fisica

UNIVERSITÀ DEGLI STUDI DI TRIESTE

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Everyone interested in the topic is welcome to attend

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