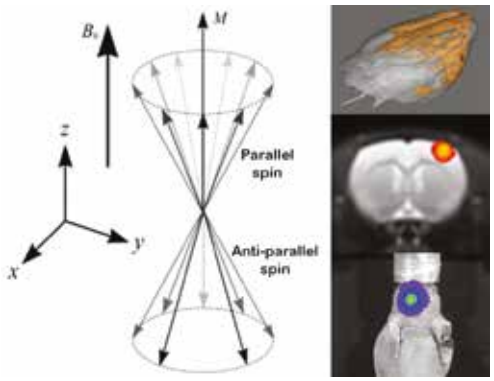

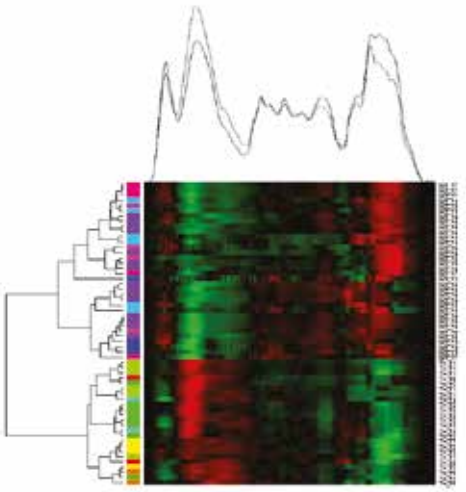

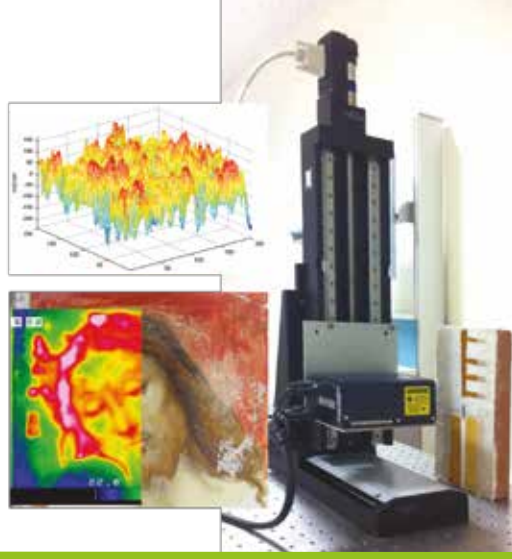

APPLIED EXPERIMENTAL PHYSICS

DESCRIPTION

The **Applied Experimental Physics** area includes research activities aimed at the study of mesoscopic phenomena in condensed matter physics and at the development of advanced physical techniques for the fields of Biomedicine, Biotechnology, and Cultural Heritage.

Main research topics of **Experimental physics** span in the field of structural and dynamical properties of solid-state systems, either in form of crystalline compounds or of nanostructured films. Current research topics are: 1) study of the optical and electronic properties of nano-structured systems; 2) study of vibrational dynamics of micro-crystalline solids; 3) development of thin film devices; 4) development of light modulators and of multipurpose advanced optical techniques.

Applied Physics for Biomedicine includes multimodal imaging based on Magnetic Resonance Imaging, Optical Imaging, Nuclear Medicine and Optical Microscopy, for investigation of experimental models of pathologies and characterization of diagnostic/therapeutic agents based on nanoparticle/biocompatible materials.

Applied Physics for Biotechnology includes FT-IR micro-spectroscopy, coupled with multivariate statistical data analysis for studies on microorganisms (yeasts and bacteria) and on plant cell physiology.

Applied Physics for Cultural Heritage includes: 1) optical techniques for nondestructive analysis of artworks, with implementation of portable devices based on infrared imaging, laser profilometry, speckle imaging; 2) laboratory spectroscopy for material analysis.

LABORATORIES

FluoLab (Fluorescence Laboratory): optical (VIS-IR) characterization of materials (absorption, photoluminesce, excitation/emission mapping, lifetimes, quantum yield).

LabRam (Raman micro-spectroscopy Laboratory): vibrational dynamics studies of single micro-crystals and vibrational Raman mapping of nonostructrured composite films. Spectroscopic investigations of phonon confinement in low-dimensional nanostructured systems.

LAPS (Laboratory for Applied Physics): fabrication and electrical/morphological characterization of thin film devices. Atomic Force Microscopy characterization of nanostructures.

IRIS (Infra Red for Interdisciplinary Studies): FT-IR spectroscopy, micro-spectroscopy and imaging in the near and mid-IR range .

OpDate (Optical Devices for Advanced Techniques): development of devices based on imaging and coherent optics for for surface and material analysis.

MRI: equipped with a 4.7 T micro Magnetic Resonance Tomograph (Bruker) for high resolution in vivo/in vitro imaging.

Optical Imaging: equipped with IVIS Spectrum optical imager (Perkin Elmer) for bioluminescence, fluorescence and Cerenkov luminescence imaging.

PROJECTS (2012-2016)

2016-2020 SOLSA "Sonic Drilling coupled with Automated Mineralogy and chemistry: On-Line-On-Mine-Real-Time", Horizon 2020 EU project

2015-2018 SCAN4RECO "Multimodal Scanning of Cultural Heritage Assets for their multimodal digitization and preventive conservation via spatiotemporal 4D Reconstruction and 3D Printing", Horizon 2020 EU project

2010-2012 ALPINE "Advanced Lasers for Photovoltaic Industrial Processing Enhancement", FP7 EU Project

PRIN 2010-11, NAMED-PEM "Advanced NAnocomposite Membranes and innovative Electrocatalysts for Durable Polymer Electrolyte Membrane fuel cells"

FIRB 2012-2016, Rete integrata per la Nanomedicina RBAP114AMK-RI.NA.ME

2012 "Functional MRI to study brain plasticity in an experimental model of MS in rats", funded by Fondazione Italiana Sclerosi Multipla (FISM)

2011-2015 "Magnetosomes as nanotechnology platform for thermotherapy of tumour", funded by Associazione Italiana Ricerca sul Cancro (AIRC)

2015 TINJET "Tin Sulphide solar cells by Ionized Jet Deposition", funded by CARITRO

2012-2015 VERONA NANOMEDICINE INITIATIVE, funded by Fondazione CARIVERONA

2011-2012 AdOpTeCH "Advanced Optical Techniques for Cultural Heritage, funded by Fondazione CARIVERONA"

POR-FSE 2014 "Tecniche ottiche per una diagnostica delle opere d'arte in situ: il Cantiere Intellingente"

POR-FSE 2012 "Materiali nano-cristallini avanzati per applicazioni in nanomedicina"

2015 "Tumor metabolism and response to therapies using innovative MRI techniques", Joint Project

2015 "Tin Film SnS solar cells by Ionized Jet Deposition", Joint Project

2013 NANOCAD "CdTe solar cells by pulse jet deposition", Joint Project

SELECTED PUBLICATIONS (2012-2016)

- V. Allodi, S. Brutti, M. Giarola, M. Sgambatterra, M.A. Navarra, S. Panero, G. Mariotto, Structural and spectroscopic characterization of a nanosized sulfated TiO2 filler and of nanocomposite Nafion membranes «Polymers», 2016.
- S. Tambalo, L. Peruzzotti-Jametti, R. Rigolio, S. Fiorini, P. Bontempi, G. Mallucci, B. Balzarotti, P. Marmiroli, A. Sbarbati, G. Cavaletti, S. Pluchino, P. Marzola, Functional Magnetic Resonance Imaging of Rats with Experimental Autoimmune Encephalomyelitis Reveals Brain Cortex Remodeling «Journal of Neuroscience», 2015.
- N. Daldosso, A. Ghafarinazari, P. Cortelletti, L. Marongiu, M. Donini, V. Paterlini, P. Bettotti, R. Guider, E. Froner, S. Dusi, M. Scarpa, Orange and blue luminescence emission to track functionalized porous silicon microparticles inside the cells of the human immune systems «Journal of Material Chemistry B», 2014.
- E. Cazzanelli, T. Caruso, M. Castriota, A. R. Marino, A. Politano G. Chiarello, M. Giarola, G. Mariotto, High quality graphene films grown on Pt(111)surface by chemical vapour deposition of ethylene «Journal of Raman Spectroscopy», 2013.
- A. Salavei, I. Rimmaudo, F. Piccinelli, P. Zabierowski, A. Romeo, Study of difluorochloromethane activation treatment on low substrate temperature deposited CdTe solar cells «Solar Energy Materials and Solar Cells», 2013.
- Ferdeghini, C. Cavedon, E. Zivelonghi, R. Calandrino, A. Fenzi, A. Sbarbati, F. Boschi, First human Cerenkography «Journal of Biomedical Optics», 2013.
- F. Monti, R. Dell'Anna, A. Sanson, M. Fasoli, M. Pezzotti, S. Zenoni, A multivariate statistical analysis approach to highlight molecular processes in plant cell walls through ATR-FTIR microspectroscopy: the role of the alpha-expansin PhEXPA1 in Petunia hybrid «Vibrational Spectroscopy», 2013.
- C. Daffara, D. Ambrosini, L. Pezzati, D. Paoletti, Thermal quasi-reflectography: a new imaging tool in art conservation «Optics Express», 2012.

PEOPLE (2017)

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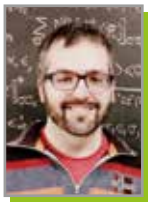

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