CURRICULUM VITAE

CNRS Research Director (DR)

Optics & Imaging team (OPTIMA)

Laboratory for Interdisciplinary Physics (LIPhy)
UMR 5588 CNRS Univ. Grenoble Alpes
140 rue de la Physique, 38400 St Martin d'Hères, France
@ResearchGate, @LinkedIn, @GoogleScholar, @Hal

Research activities

As a physicist and materials scientist, my goal is to understand fundamental structure-function relationships in mineralized tissues such as bone and bone-like materials (tooth dentin, ivory tusk) while also addressing applied biomedical or archaeological questions.

My research consists in developing new imaging methods, analytical tools and concepts to decipher the functional impact of the material's nanostructure, multiscale hierarchy, disorder, interfaces and structural gradients of the tissue, on one side, and of the cellular network topology and multiscale porosity on the other.

My main expertise is in synchrotron X-ray imaging and analysis with scattering contrast (SAXS, WAXS, XRD), fluorescence optical microscopy and non-linear imaging methods (two-photon, second and third-harmonic generation) and analytical methods related to the physics of complex systems. One specificity of my work is that we work on the whole chain from advanced sample preparation, instrument development, to scientific analysis.

Academic career

2024-present: CNRS Research Director at the Laboratory for Interdisciplinary Physics (LIPHY), Grenoble, France.

2020-24: Head of the Optics & Imaging team (OPTIMA) (10 scientists, 4 engineers and technicians, > 10 postdocs and PhD students).

2018: Habilitation (HDR) in Physics (Physics for Life Sciences) from the Univ. Grenoble Alpes: *Bone quality at the nanoscale, a contribution from quantitative scanning-SAXS imaging*.

2012-24: CNRS Researcher at LIPHY, Grenoble, France..

2007-12: CNRS Researcher at the Laboratoire de Physique des Solides (LPS), Orsay, France.

2005-16: Visiting Scientist at the European Synchrotron Radiation Facility (ESRF) in the Structure of Soft Matter & X-ray Nanoprobe groups, ID13 beamline.

2004-06: Post-Doctoral Researcher at the Biomaterials dpt. of the Max-Planck Institute for Colloids & Interfaces, Potsdam, Germany.

2000-04: Ph.D. of the Université Joseph Fourier (UJF) and the European Synchrotron radiation facility (ID13, ESRF), Grenoble, France

Supervision of 8 PhD thesis, 17 MSc students, 2 Project Engineers

45 publications in peer reviewed papers and conference proceedings, 4 book chapters

Reviewer in Acta Biomater (reviewer award 2019), Archéosciences, Bone, J Appl Crystallogr, J Appl Oral Sci, J Archaeol Sci, J Eng Med, J Mech Behavior Biomed Mater, Molecules, Nanoscale, Ultras, Sci Rep.

Scientific societies

Co-founding member of the AFURS (French National Organization of Synchrotron Users), committee (Bureau 2014-18) and french delegate for the ESUO (European Synchrotron Users Organization 2015-16); member of the Société Française de Biologie des Tissus Minéralisés (SFBTM), of the French Chapter of the International Medical Geology Association (IMGA), of the GDR Imabio (ImaBio), IASIS (IASIS); management committee (COMEX) of the Labex CEMAM (Centre of Excellence of Multifunctional Architectured Materials, Grenoble > 2021); Comité de Liaison de la Section 05 of the CNRS (2010-15).

Academic projects and activities

2024-29 : Chair of the Multidisciplinary Institute for Artificial Intelligence (MIAI) Grenoble – 400 k€.

Geometry-aware multimodal super-resolution imaging of microscopic cellular porosity in bones and teeth

Partners : E. Brun (STROBE Lab, INSERM Grenoble), M. Langer (TIMC Lab, CNRS Grenoble), E. Vennat (LMPS, Centrale-Supelec, Paris-Saclay) and D. Rousseau (LARIS, Université d'Angers)

2021-24 : Research Grant from the Human Frontier Science Program (HFSP) – 1.1 M$.

The role of bone cellular and sub-cellular porosity network connectomics on calcium homeostasis

Partners : K. Grandfield, McMaster University (Canada, projetct leader), A. Carriero, The City College of New York (USA), A. Gourrier, LIPhy

2014-18: ANR MULTIPS – 506 k€

MULTIPhysic & multiScale assessment of bone quality

Partners : P. Laugier (coordinator), Q. Grimal, LIB, Paris; H. Follet, D. Farlay, INSERM, Lyon; A. Gourrier, LIPHY, Grenoble; F. Peyrin, CREATIS, Lyon.

France-Canada Research Fund (FCRF) program (2018, 18 k€) ; PhD grant AGIR (2013) ; PhD grant Nanoscience Foundation Grenoble (2013) ; Défi Instrumentation aux limites CNRS (2013, 15 k€) ; PNRCC (2010, project leader I. Reiche, C2RMF, 60 k€) ; PIR CNRS Interface physique chimie biologie (2010, 50 k€) ; BQI Université Lyon (2010, project leader G. Boivin, INSERM, 90 k€).

Innovation projects

2022-23: Maturation Program of the SATT LINKSIUM – 242.3 k€

ThickMap project: High precision contactless thickness mapping device for metrology

2020-21: CNRS (INP) Innovation Program – 96 k€

ThickMap project **FR patent 3107346**

2019: Challenge Out-of-labs of the SATT LINKSIUM – 15 k€

ThickMap project

Teaching

Since 2019: Member of the organizing committee of the *European School of Nanosciences and Nanotechnology* (ESONN).

Since 2012: *Matériaux Biologiques & Biomimétisme*. 5th year course, Polytech' Grenoble, Materials Science and Engineering Dpt.