Editorial: Nanoscience and Nanotechnology in Provence-Alpes-Côte d'Azur

Margrit Hanbücken, Michel Lannoo, Wilfried Blanc, Thierry Djenizian and Lionel Santinacci

C’Nano PACA,
Campus Luminy – Case 913,
F-13288 Marseille, France
Fax: +33 491 418 916
E-mail: direction@cnano-paca.org
E-mail: michel.lannoo@cnrs-dir.fr
E-mail: wilfried.blanc@unice.fr
E-mail: thierry.djenizian@univ-provence.fr
E-mail: santinacci@cinam.univ-mrs.fr

Abstract: An overview over activities in nanoscience and nanotechnology in France and specifically the Provence-Alpes-Côte d’Azur Region is given. Nanoscience activities are organised and funded in France by several institutions. A dedicated national programme, called C’Nano and which is coordinated by the French National Center for Scientific Research – CNRS, assures the animation. Project funding comes on the national level from the French Ministry for Higher Education and the French National Research Agency (ANR) or regionally from Universities and Regional and Local Councils. The activities and initiatives in nanoscience are accompanied by dedicated teaching and educational programmes.

Keywords: C’Nano PACA; biotechnology; bioelectronics; nanomaterial; sustainable energy; instrumentation; environment; electronic devices.


Biographical notes: Margrit Hanbücken is Research Director in the French National Center for Scientific Research (CNRS). She obtained her PhD in Physics from the Ruhr-University in Bochum in Germany. After a professional start in Germany and a position at the University of Sussex in England, she is now heading an interdisciplinary group of Nanoscience in CINaM-CNRS in Marseille. The group develops new strategies for the nanofabrication and functionalisation of novel templates, subsequently used in different fields going from physics to biology and looking at fundamental aspects as well as applications. She is heading the Competence Centre of Nanosciences and Nanotechnologies of the Provence-Alpes-Côte d’Azur region (c’nano-PACA).

Michel Lannoo is a Professor at Aix-Marseille University. He obtained his Doctorate in 1969 with J. Friedel. Since then, he has been Director of research in CNRS, 1984; Director of Laboratory of Surfaces and Interfaces, Lille (1979–1991); Vice-Director of the Institute of Electronics, Microelectronics
and Nanotechnology, Lille (1991–1998); Director of the Laboratory of Materials and Microelectronics of Provence, Marseille (2000–2006); Vice-Director of Physics and Engineering at the Ministry of Research, 1998; President of the Nanoscience Program, 1999; Director of Mathematics and Physics at CNRS, 2003; Director of Mathematics, Physics, Planet and Universe at CNRS (2006–2008); Research Vice-President of Paul Cezanne Aix-Marseille University since 2008 and Adviser of the President of CNRS for Nanoscience and Nanotechnology since 2008. His research fields include theoretical physics of semiconductors, defects, surfaces and nanosciences, which led to 400 publications, 70 invited talks in international conferences, 50 review papers, member of many international committees and editorial boards and author of four books as well as several distinctions.

Wilfried Blanc has worked extensively with rare earth doped materials. He prepared his PhD thesis at the Laboratoire de Physico-Chimie des Matériaux Luminescents, University of Lyon (France). The work aims at understanding the energy transfer between the matrix and rare earth ions. After completing his thesis in 2000, he spent one and half year in a post-doctoral position at the Institut de Chimie de la Matière Condensée de Bordeaux, University of Bordeaux (France) where he worked on the synthesis of new rare earth doped phosphors. In 2002, he commenced with the Centre National de la Recherche Scientifique (CNRS), where his main interests are the design, realisation and characterisation of silica optical fibres, which are made by using a Modified Chemical Vapour Deposition (MCVD) technique.

Thierry Djenizian received his PhD from the Swiss Federal Institute of Technology in Lausanne and the University of Erlangen-Nuremberg in 2002. He worked there as an Assistant Professor before filling a Maître de Conférence position at the Aix-Marseille University in 2006. Since 2011, he joined the Lasers, Plasma and Photonic processes Laboratory (Mediterranean University) as a Full Professor. His research activities are mainly focused on the study of fundamental and applied electrochemical processes to fabricate one-dimensional nanostructures for applications in the field of energy storage and conversion. He is the author of 50 publications in international journals.

Lionel Santinacci is a Research Scientist at French National Center for Scientific Research (CNRS). He performed his PhD thesis at Swiss Federal Institute of Technology of Lausanne and University of Erlangen under the supervision of P. Schmuki (1998–2002). He was involved in several projects targeting the electrochemical nanostructuring of surfaces. Back to Aix-Marseille University in 2002, he studied Li-polymer batteries. In 2003, he joined Chimie ParisTech as an Assistant Professor to investigate the localised corrosion. Finally, he got a CNRS position at the Lavoisier Institute of Versailles to investigate the anodic surface structuring of III-V materials. Since 2009, he is integrated with the Interdisciplinary Center for Nanoscience of Marseille (CINaM) to work on TiO$_2$ nanotubes and Al$_2$O$_3$ membranes functionalised by atomic layer deposition.

The Provence-Alpes-Côte d’Azur (PACA) region, in southern France, has important industry, academic research and training centres in Nanoscience and Nanotechnologies, which are located around two main sites: Marseille and Nice. The Nanoscience Competence Center, C’Nano-PACA, federates this nanoscience community. C’Nano
PACA, created in 2008, is one of the six Competence Centres set up in France at the initiative of the French Research Ministry, the National Center for Scientific Research (CNRS) and the CEA, the Atomic Energy Commission. In the Provence-Alpes-Côte d’Azur region, C’Nano PACA is supported by the Universities of Aix – Marseille, Avignon, Toulon and Nice. About 40 laboratories participate in C’Nano PACA with 80 research groups counting around 700 participants. A technological platform is associated to C’Nano PACA and can be used by all members. It is also dedicated to technological training of students and scholars.

The identification of new inter- and pluridisciplinary scientific projects, federating research groups coming from different laboratories and various scientific domains, is the main ambition of C’Nano PACA. Innovative, interdisciplinary topics have been defined in agreement with the academic and regional institutions (Universities, CNRS and Regional Council). The selected topics cover interdisciplinary domains of physics, biology, medicine, pharmacy and chemistry in the field of biotechnology, bioelectronics, sustainable energy solutions, biodetection, instrumentation and research related to environmental control.

Annual calls for these emerging interdisciplinary topics permit the funding of high-quality projects with innovative character. Projects are selected by independent, high profile scientists from outside the PACA Region. The selection process is accompanied by a scientific steering committee.

This initiative, aiming to identify, favour and develop emerging research topics, is accompanied by adapted high-level teaching cycles at the Universities through different Master courses in nanoscience, as well as through dedicated summer schools, workshops and conferences on specific topics. The latter are often co-organised with international colleagues and institutes of high scientific level in the concerned fields. An annual Conference held in May assembles the whole community on the Porquerolles Island in the Mediterranean Sea. On the programme are: a common brainstorming, scientific review presentations and discussions with representatives of industrial partners. Funded projects are presented and possible future projects defended.

Actualised information about all ongoing and upcoming conferences, workshops and schools is available on the C’Nano PACA website at the following address: http://www.cnano-paca.fr

In parallel to the academic initiatives in nanoscience and nanotechnology, market-oriented initiatives have been launched in France through Competitiveness Clusters. These clusters have a strategy of economic development consistent with the region’s strategy, focusing on technologies for markets of high potential and reaching a critical mass to become competitive on the world stage. C’Nano PACA has close links to several Competitiveness Clusters. Confronting the academic nanoscience-community and their know-how in interdisciplinary fields with the industrial demands for innovation and breakthrough is the logical step to accelerate the innovation process and to permit future successful business with the focus to create wealth and employment within the region.

As mentioned earlier, the Provence-Alpes-Côte d’Azur Competence Center in Nanoscience and Nanotechnology – C’Nano PACA – federates the region’s nanoscience community on selected topics, covering interdisciplinary domains of physics, biology, medicine, pharmacy and chemistry. The selected topics are from environmental survey,
biotechnology and bioelectronics, drug delivery, sustainable energy, electronic devices and instrumentation. The approaches are often based on a detailed knowledge of nanomaterials and nanostructures on surfaces.

This volume reflects the research activities of leading groups in the above-mentioned fields of excellence in the Provence-Alpes-Côte d’Azur region through 30 papers. The contributions were selected by an Editorial Board composed of Wilfried Blanc, Thierry Djenizian, Lionel Santinacci and Margrit Hanbücken.

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