CURRICULUM VITAE

JOHN PETER PALMERI

Head Research Scientist (Directeur de Recherches), French CNRS *(Centre National de la Recherche Scientifique), Membrane Industry Consultant*

Specialty:
Theoretical Condensed Matter Physics / Statistical Physics
Biophysics / Membrane Transport Theory

Dual American-French Nationality

PROFESSIONAL ADDRESS

NEW ADDRESS (SEPTEMBER 2012)

Laboratoire Charles Coulomb UMR 5221 CNRS-UM2
Département Physique Théorique
Université Montpellier 2
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OLD ADDRESS

Laboratoire de Physique Théorique
IRSAMC UMR CNRS-UPS 5152
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PROFESSIONAL ACTIVITIES

[2012-] Head Research Scientist (DR2), CNRS, Laboratoire Charles Coulomb UMR 5221 CNRS-UM2, Département Physique Théorique, Université Montpellier 2.

[2006-2012] Research Scientist (CR1), CNRS, Laboratoire de Physique Théorique de Toulouse, Université Paul Sabatier, Toulouse 3.

[1994-2006] Research Scientist (CR2-CR1), CNRS, Institut Européen des Membranes (IEM),
University of Montpellier II, France:

- *Transport Theory and Modeling* Group Leader at the IEM (1999 – 2004).
- Appointed Member, Recruiting Commission (*Commission de Spécialistes)* CNU 28 (Condensed Matter Physics) , University of Montpellier II (2001 – 2004).

[Spring 1998] Visiting Professor, University of Colorado at Boulder, USA,
Department of Chemical Engineering.

[1991-1993] Physicist at the *Institut Laue-Langevin* (ILL), Grenoble, France, Theoretical Physics Group.

[1989-1991] Postdoctoral Researcher in the Theoretical Physics Group [*Service de Physique Théorique]* of the *Centre d'Etudes Nucléaires de Saclay (CENS)*, French Atomic Energy Commission (CEA), Gif-sur-Yvette, France.

[1983-1989] Research and Teaching Assistant, Physics Department, University of Illinois at Urbana-Champaign, USA.

EDUCATION

[2001] *Habilitation à Diriger des Recherches (HDR)*, University of Montpellier II, France: *Transport Theory: from Traditional Condensed Matter to Artificial Membranes*

[1989] Ph.D., Theoretical Condensed Matter Physics,
B-Phase Nucleation and A-B Interface Dynamics in Superfluid ^{3}He
University of Illinois at Urbana-Champaign, USA;
Thesis Advisor: Prof. A.J. Leggett.

[1984] M.S., Physics, University of Illinois at Urbana-Champaign, USA

[1982] A.B., Physics, Princeton University, USA.

GRANTS AND HONORS

National Science Foundation NSF-NATO Postdoctoral Fellowship (USA), 1991 et 1993.

Grant for Long Term Research at Foreign Centers of Excellence (1989 -1991), *National Science Foundation* (NSF), USA.

Postdoctoral Research *Chateaubriand* Grant, French Government (1989 -1990).

Coordinator ANR PNANO-2007 Project, SIMONANOMEM : Simulation and Modeling of the transport across Polymeric Nanoporous Membranes prepared by self-assembly of block copolymers (4 partners, 3 years). (supervision of 2 thesis students and 1 postdoc).

CURRENT AREAS OF RESEARCH

- Biophysics: Modeling of biologically inspired interfaces and artificial membranes; Structure and Transport theory; thermal DNA denaturation transitions in the bulk, near interfaces, and in nanopores.

- Transport theory of ions and neutral molecules in organic and inorganic nanoporous membranes (nanofiltration and ultrafiltration): Mesoscopic models and molecular dynamics simulations of water, ions and neutral solutes in confined geometries (nanopores).

- Development of the nanofiltration computer simulation program ***NanoFlux*** for ion and neutral solute transfer:
www.fist.fr/fr/filtration-separation/nanoflux-software-advanced-tool-for-the-prediction-and-scaling-up-of-nanofiltration-processes-2.html

- Theory of facilitated ionic transport in dense functionalized polymer membranes and supported liquid membranes.

SELECTED PUBLICATIONS IN THEORETICAL CONDENSED MATTER/BIO-PHYSICS

1. *Thermal Denaturation of Fluctuating DNA Driven by Bending Entropy*, Physical Review Letters 99, 088103 (2007). (J. Palmeri, M. Manghi, and N. Destainville).

2. *Variational approach for electrolyte systems: from dielectric interfaces to charged nanopores*, Physical Review E **81**, 041601 (2010) (S. Buyukdagli, M. Manghi, J. Palmeri)

3. *Microscopic mechanism for experimentally observed anomalous elasticity of DNA in 2D*, Biophysical Journal **96**, 4464 (2009) (N. Destainville, M. Manghi, J. Palmeri)

4. *Ionic Capillary Evaporation in Weakly Charged Nanopores*, Phys. Rev. Lett. **105**, 158103 (2010) (S. Buyukdagli, M. Manghi, and J. Palmeri)

5. *Molecular Simulation of Ion-Specific Effects in Confined Electrolyte Solutions Using Polarizable Force fields,* J. Phys. Chem. C **114**, 12245 (2010) (P.-A. Cazade,J. Dweik, B. Coasne, F. Henn, J. Palmeri).

SELECTED RECENT PUBLICATIONS IN MEMBRANE TRANSPORT THEORY

1. *Nanofiltration theory: an analytic approach for single salts*, Journal of Physical Chemistry B **108** (2004) 16811-16824 (X. Lefebvre, J. Palmeri, P. David).

2. *Computer Simulation of Nanofiltration, Membranes and Processes* in: Handbook of Theoretical and Computational Nanotechnology, edited by Michael Rieth and Wolfram Schommers, Volume 5, Pages 93−214, American Scientific Publishers, 2006 (Horst Chmiel, Xavier Lefebvre, Valko Mavrov, Mohan Noronha, John Palmeri). http://www.lpt.ups-tlse.fr/IMG/pdf_Handbook_NF_Chapter-Palmeri-2006.pdf

3. *Effect Of Temperature On The Transport Of Water And Neutral Solutes Across Nanofiltration Membranes*, Langmuir **23** (2007) 2937-2952 (Nihel Ben Amar, Hafedh Saidani, André Deratani, John Palmeri)

4. *Generalized dual-mode modelling of xylene isomer sorption in polyvinylalcohol membranes containing alpha-cyclodextrin* , Journal of Membrane Science **317** (2008) 2−13 (S. Touil, J. Palmeri, S. Tingry, S. Bouchtalla and A. Deratani)

5. *Process modeling of brackish and seawater nanofiltration*, Desalination and Water Treatment **9**, 263 (2009). [J. Palmeri, N. Ben Amar, H. Saidani, A. Deratani]

Ph.D. THESES SUPERVISED

1. S. Marre, *Fundamental Theoretical Study of Aerosol Filtration by Ceramic Membranes,* October 2001, financed by COGEMA (France), University of Montpellier II, France.

2. X. Lefebvre, *Study of Nanofiltration Models: Application of the Hybrid Model based on the extended Nernst-Planck Equations via the development of the simulation program NanoFlux*, October 2003, University of Montpellier II, France (Thesis Prize 2003, Club Français des Membranes).

3. Mehdi METAICHE*, Optimization of Reverse Osmosis Desalination Systems*, thesis in collaboration with the “Ecole Nationale Polytechnique d’Alger”, Algeria, December 2007.

4. Jalal DWEIK, *Molecular Modeling of Membrane Transport*, University of Montpellier II, French Ministry of Education grant, December 2008.

Ph.D. THESES IN PROGRESS

1. Lorand HORVATH, *Molecular Dynamics Studies of Water, Ions, and Macromolecules in Nanopores,* UPS –Toulouse, financed by the “Agence Universitaire de la Francophonie” (AUF), in collaboration with Prof. T. Beu of the University "Babes-Bolyai", Faculty of Physics, Cluj-Napoca, Romania, in progress.

TEACHING

Courses in:

- *The Physical Properties of Materials***,** Ecole National Supérieure de Chimie de Montpellier, France, University of Montpellier II *(Masters degree level).* (1997-2006)

- *Membrane Transport Theory,* University of Montpellier II, France *(Master/Doctoral degree level).* (2001-2006)

- *Brackish and seawater desalination using NF and RO membranes: transport theory, modeling, and process simulation*, invited 4-day Intensive Course, Middle East Desalination Research Center (MEDRC) (Casablanca, Morocco, 2-5 February 2009

- INSA-Toulouse (2011): First year course in Optics.

ANR PNANO-2007

SIMONANOMEM : Simulation and Modeling of the transport across Polymeric Nanoporous Membranes prepared by self-assembly of block copolymers
(4 partners : LPT, Toulouse ; IEM, Montpellier ; CROPS, Marseille ; ICG, Montpellier), February 2008 - February 2011; **Coordinator, John Palmeri**.

Résumé: *In order to bring the novel and revolutionary properties of nanostructured materials to the macroscale of industrial applications, we propose to develop reliable and efficient methods for modeling and simulating the liquid-phase transport properties of ions and small molecules in nanopores (confined aqueous systems). We will develop self-assembly techniques for obtaining block-copolymer nano-materials with transport properties tailor-made for given industrial separation problems via a better understanding of solute-solute and solute-nanomaterial interactions. These multi-scale modeling techniques will be validated by comparison with both experiments performed on model systems and molecular-level computer simulations. In the area of nanoporous membranes (nanofilters for purification processes, contactors, and sensors), empirical trial and error methods are unable to lead successfully and economically to optimized systems. Because fundamental scientific knowledge at the nanoscale is still lacking and brute force molecular simulations of nanomaterials are not yet capable of bridging the length and time scales needed to reach the macroscale, we propose carrying out a synergetic three pronged attack to better master the fabrication and transport properties of nanoporous membranes: 1.Experimental membrane preparation and characterization, 2. Theory and modeling going beyond bulk continuum methods, 3. Molecular level simulations*

SOFTWARE DEVELOPMENT

• Development of the nanofiltration computer simulation program ***NanoFlux*** for industrial membrane processes - ion and neutral solute transfer
www.fist.fr/fr/filtration-separation/nanoflux-software-advanced-tool-for-the-prediction-and-scaling-up-of-nanofiltration-processes-2.html

(7 User licenses and other academic and industrial licenses under negotiation).

CONSULTING

1. Techno-Membranes, R&D center, Montpellier, France; Consulting in the area of nanofiltration.

2. Aker Kvaerner **CHEMETICS, Inc. (Vancouver, British Columbia, Canada)**
   Patent defense assistance: European Patent 0821615, *Nanofiltration of concentrated aqueous salt solutions*, sulfate removal system (SRS) technology for the chloralkali industry (Nanofiltration).

3. ARCILLA BLANCA,S.A. Partida Foies Ferraes, s/n, 12110 l'Alcora (Castellón) Espagne (Nanofiltration)