

Curriculum Vitae

Pascal Brault

**Senior Research Fellow at CNRS
(Directeur de Recherche)**

Orléans, September 15, 2016

CURRICULUM VITAE



Name : M. BRAULT Pascal

Place and birth date : Born 15 février 1961 in LE BLANC (France)

Nationality : French

Appointment: Directeur de Recherche 2° Classe CNRS

Director of Laboratory FR776 EPEE 'Energie, Propulsion, Espace, Environnement since January, 1st 2006

Work Address :

Groupe de Recherches sur l'Energétique des Milieux Ionisés, UMR 6606 et FR W0776

Polytech'Orléans Université d'Orléans BP 6744, 45067 ORLEANS Cedex 2

Tel : 02 38 41 71 25 Fax 02 38 41 71 54 e-mail Pascal.Brault@univ-orleans.fr

Foreign languages : English and German , fluent (written and spoken)

Diploma :

Habilitation à diriger des Recherches (Orléans 20 mars 1992)

Plasma Surface Interactions : Fluorinated plasma etching of Silicon:Chemical Physics and surface structure modifications.

(Interactions Plasma -Surface : Gravure du silicium par plasmas fluorés. Physico-chimie et modifications structurelles en surface.)

Committee : B. Dubreuil (Président), J. P. Gauyacq (Rapporteur), M. Stutzmann (Rapporteur), P. Ranson (Rapporteur), J. P. Toennies, H. Estrade-Szwarckopf, R. Vetter, C. Leborgne, O. Vallée

Ph D University of Orléans (Orléans, 12 juin 1987, Thesis Supervisor: Prof. O. Vallée)

(Préparé at Meudon Observatory)

Semiclassical models for collision theories : Applications to radial coupling studies, reactive scattering induced by a radiation field and to solar Rydberg spectral line broadening

Modèles semiclassiques en théorie des collisions : applications l'étude du couplage radial, aux collisions réactives induites par un champ de rayonnement et à l'élargissement des raies de Rydberg solaires.

PhD committee : J. Chapelle (Président), B. Dubreuil (Rapporteur), N. Tran Minh (Rapporteur), G. Chambaud, N. Feautrier, G. Grynberg, O. Vallée, R. Vetter

Member of the Thesis Committees for 20 PhD or Habilitation

Honor: Alexander von Humboldt Fellow 1992-1993

Max Planck Institute for Fluid Mechanics, Prof. J. P. Toennies, Göttingen
Molecular beam interactions with metallic surfaces

Laureate of "Tremplin Recherche" Prize from French Senate (Paris 12 February 2008)

Laureate of "Trophy of Public Research: Energy, Environment and Climate change 2015" (Paris, World Efficiency Conference, 13 October 2015)

Activity topics

I was involved from 1988 to 1992 in plasma etching research for IC miniaturization. Focus was on surface modifications using electron spectroscopy as XPS and in-situ Raman Spectroscopy. Surface roughness was also studied from a theoretical point of view using Stochastic partial derivative equations. Self similar properties of plasma etched surfaces were predicted.

Since 1992, I was involved in plasma sputter deposition of catalytic clusters on flat surfaces. Cluster growth scaling laws were determined and new scaling was observed for Palladium and platinum and rhodium growth.

Ultrathin (8 nm) continuous layers of palladium were obtained using particular plasma conditions. This is the thinnest continuous Pd ultra thin films to date.

Since 1999, I extend the plasma sputtering techniques for the synthesis of porous fuel cell electrodes. The plasma sputtering technique offers the unique opportunity to design well suited electrodes with very low contents of catalysts with defined catalytic clusters. The main feature of this work is the discovery of the very good control of the catalyst profile in the porous electrode leading to efficient fuel cells with very low content of platinum catalyst ($< 10 \mu\text{gPt}\cdot\text{cm}^{-2}$)

SOFC thin film deposition is carried out for reducing working temperature using reactive I-PVD.

Numerical simulations, especially Molecular Dynamics, in the context of magnetron sputtering and deposition of fuel cell catalysts and also soot formation in plasma and CVD processes are carried out for interpreting experiments.

I am the author of 131 publications in international scientific journals. I am inventor in 7 patents. I have presented 42 invited conferences among 15 in international conferences, and more than 200 communications

I have supervised around 20 Ph D thesis.

Experiences:

Executive Officer in charge of the Energy Research policy at CNRS

Director of the Research Institute "Energetics, Propulsion, Space and Environment" (CNRS – FR776 EPEE)

Coordinator of the SMARTCat JTI FCH-JU project (Call 2012)

Coordinator of french funding agency ANR project AMADEUS: technology transfer of fuel cells

Chairman of Selection committee "Energy" of the French funding Agency ANR

Associate Editor of "Frontiers in Physics : Plasma Physics"

<http://journal.frontiersin.org/journal/physics/section/plasma-physics#>

Project manager in CNRS Energy Program (PLASMAPAC)

Scientific manager of a large regional program on fuel cells involving European Social Fund (2 M€)

Regional partner of the INTERREG IIC "International Cooperation Platform for Sustainability". ICOPS project (www.icops.eu)

Manager of the project "Future Energies" French government - Region Centre Project Contract (5 M€)

Manager of Regional project on solid oxide fuel cell (300 k€)

Referee for EU-ISTU projects (FP6), CONCERT – Japan,

Referee for PHC program (France)

Referee for numerous peer reviewed international scientific journal

Member of the scientific committee of the international conferences « Innovations on Thin Films Processing and Characterisation » and « International Symposium on Plasmas for Catalysis and Energy Materials ».

10 preferred Publications

1. **P. Brault**, A. Caillard, A. L. Thomann, J. Mathias, C. Charles, R. W. Boswell, S. Escibano, J. Durand, T. Sauvage, *Plasma sputtering deposition of platinum into porous fuel cell electrodes*, J. Phys. D **37** (2004) 3419–3423
2. P. Brault, Ch. Josserand, J.-M. Bauchire, A. Caillard, Ch. Charles, R. W. Boswell, *Anomalous diffusion mediated by atom deposition into a porous substrate*, Phys. Rev. Lett. **102** (2009) 045901
3. M. Cavarroc, A. Ennadjaoui, M. Mougenot, P. Brault, R. Escalier, Y. Tessier, J. Durand, S. Roualdès, T. Sauvage, C. Coutanceau, *Performance of plasma sputtered Fuel Cell electrodes with ultra-low Pt loadings*, Electrochemistry Communications **11**, 859 – 861 (2009)
4. D. B. Graves, **P. Brault**, *Molecular dynamics for low temperature plasma-surface interaction studies*, J. Phys. D **42** (2009) 194011, (Topical Review, 27 pages)
5. P. Brault (Review Article), *Plasma deposition of catalytic thin films: Experiments, Applications, Molecular modeling*, Surf. Coat. Technol. **205** (2011) S15-S23
6. X. N. Guo, **P. Brault**, G. Zhi, A. Caillard, G. Jin, XY. Guo, *Structural Evolution of Plasma Sputtered Core-shell Nanoparticles for Catalytic Combustion of Methane*, J. Phys. Chem. C **115** (2011) 24164-24171
7. M. Mougenot, A. Caillard, **P. Brault**, S. Baranton, C. Coutanceau, *High Performance Plasma Sputtered PdPt Fuel Cell Electrodes with Ultra Low Loading*, International Journal of Hydrogen Energy **36** (2011) 8429-8434
8. L. Xie, **P. Brault**, J.-M. Bauchire, A.-L. Thomann, L. Bedra (article invité), *Molecular Dynamics simulations of clusters and thin film growth in the context of plasma sputtering deposition*, J. Phys D **47** (2014) 224004
9. L. Xie, **P. Brault**, C. Coutanceau, A. Caillard, J. Berndt, E. Neyts, *Efficient amorphous platinum catalyst cluster growth on porous carbon: A combined Molecular Dynamics and experimental study*, Appl. Cat. B, **62** (2014) 21 – 26
10. **P. Brault**, E. Neyts, *Molecular dynamics simulations of supported metal nanocatalyst formation by plasma sputtering*, Catalysis Today **256** (2015) 3-12

See for details :

<http://www.univ-orleans.fr/gremi/pascal-brault>

<http://Pascal.Brault.pagesperso-orange.fr>

http://www.researchgate.net/profile/Pascal_Brault

<http://www.researcherid.com/rid/A-7027-2009>

http://scholar.google.fr/citations?user=Jzng5nEAAA&hl=frhttps://www.researchgate.net/profile/Pascal_Brault

