Catherine Bréchignac

Ambassadrice déléguée à la science, la technologie et l'innovation
Secrétaire perpétuel honoraire de l'Académie des sciences

It is in my deepest convictions to maintain a balance between my various activities: purely scientific research activity as a nanoscience physicist, scientific leadership activity as Director General and then President of the CNRS, activity in scientific diplomacy in close relation with the Ministry of Foreign Affairs and the network of French embassies abroad.

Thus, throughout my career, despite the important scientific responsibilities I have assumed, I have always maintained a scientific activity, in the laboratory until 2011, then as an essayist writing books on the scientific process, in order to explain how science is built and scientific thinking develops over the years.

It is this passion for science, to defend and promote it in France and internationally, that led successive governments to appoint and confirm me as Ambassador at large for Science, Technology and Innovation. With the support of the French embassies, I have worked for the success of "science and technology forums" that have been held abroad: Mexico, Uruguay, Vietnam, Mauritius, Senegal, Cuba... As President of the CNRS and then Permanent Secretary of the Academy of Sciences, I have developed international relations between French and foreign scientific institutions, particularly Russian. Within the Interacademic Group for Development (GID) whose motto is to put knowledge at the service of development, I play a leading role in the action carried out on "science and technology at the service of heritage" with the objective of training in heritage professions and particularly in Mediterranean heritage. The impact of the World Meeting on Heritage, Science and

Technology organized by the GID in February 2019 in Paris, followed by the symposium held in Lebanon, is at the origin of a program of the MEAE (French Ministry of Foreign Affairs), of which the GID is coordinator, on Training in the service of the preservation and enhancement of heritage in the Near East (Iraq, Jordan, Lebanon).

- ## Scientific Works

As a physicist, working at the crossroads between disciplines, I obtained my PHD in 1977, at the interface between atomic and nuclear physics. I then became interested in collisional processes under laser radiation, at the interface between atomic and molecular physics. Since 1981, I was pioneer, and I obtained my most original results, in the development of the physics of aggregates at the interface between diluted and condensed matter, where the contribution of knowledge in one of the disciplines is determining for the progress in the understanding of the other.

Aggregates, systems composed of a few atoms to tens of thousands of atoms, no longer have the properties of isolated atoms in the gas phase and not yet those of massive solids. They constitute the prototype of the finite system, ideal object to understand the properties of matter at intermediate scales. As individual objects they are elementary bricks of more complex objects and are thus positioned as precursors of "nano-objects".

The mastery of aggregates in a size range between 1 and 10 nanometers allowed me to decode the optical response of metallic aggregates as a function of their size, to understand their stability, to highlight their fission under the influence of charges and to follow their oxidation. Original experiments of aggregates deposited gently on a graphite surface show a strong mobility of these edifices composed of several hundreds of atoms, which aggregate to form fractal morphologies like frost crystals or corals. Understanding the formation of these dendritic objects from disorder, their stability as a function of temperature or under the effect of chemical impurities in order to highlight the influence of corrosion on their dissociation was one of the outstanding results of my research work.

Education and Scientific career

1967 Diplômée de l'École normale supérieure
1971 Agrégée de Sciences physiques
1977 Docteur ès sciences, PhD, université Paris-Sud
1971-1978 Attachée de recherche au CNRS
1977-1978 Professeur Université Ouagadougou Burkina Faso
1978-1985 Chargée de recherche au CNRS
1979-1980 Associate Researcher at Herzberg Institute (Ottawa Canada)
1985-1991 Directeur de recherche 2e classe au CNRS
1987 Invited professor at Ecole polytechnique fédérale de Lausanne (Suisse)
1991-1998 Directeur de recherche 1e classe au CNRS
1998- Directeur de recherche classe exceptionnelle au CNRS
2001-2002 Adjunct Professor Georgia Tech University (USA)
2002-2006 *Distinguished Visiting Scholar Professorship* Georgia Tech University

Editorial Board membership

1990-1997 Member of the editorial board of Zeitchrift. für Physics D
1992-1995 Member of the editorial board of Chemical. Physics. Letters
2001- 2005 Member of the editorial board of Nano Letters
2003-2006 Member of the editorial board of J. Phys. B

Management, leadership and Responsibilities

1985-1989 Chargée de mission au CNRS (département Sciences physiques et mathématiques)
1989-1995 Director of laboratoire CNRS Aimé Cotton Orsay
1995-1997 Chief Scientific Officer for physics & mathematics at CNRS
1997-2000 Directeur général du CNRS
2002-2006 President of Institut d'optique
2004-2009 President of the Board of Directors of Palais de la Découverte
2005- Member of the« Identification Committee » for ERC
2006-2010 President of the CNRS
2006-2010 Administrateur de Renault SA
2006-2012 Member of the board of « éthique publicitaire de l'Autorité de

régulation professionnelle de la publicité (ARPP)
2008-2011 President of International Council for Science (ICSU)
2009-2011 President of the « Haut Conseil des Biotechnologies »
2010- Ambassador at large for science, technology & innovation
2010-2020 Member of the board of Haut Comité des célébrations nationales
2010-2016 Member of the board of Conseil scientifique de l'Office parlementaire d'évaluation des choix scientifiques et technologiques (OPECST)
2010-2021 Member of the board of conseil scientifique de la Bibliothèque nationale de France
2011-2019 Secrétaire perpétuel de l'Académie des sciences
2012-2016 Member of the board of directors and Presidente du comité R&D Eco-Emballages
2014- President of the scientific board of Ecole Nationale Supérieure de Police
2017-Member of the dialogue de trianon (France-Russie)

- Honors and Awards

Price (Gustave Ribaud) of Académie des sciences (1991)
Silver Medal of CNRS (1994)
Corresponding member of Académie des sciences (1997) Member (2005)
Foreign member of the American Academy of Arts and Sciences (USA)(1999)
Member of the "National Academy of Technologies" (France) (2000)
James Frank lecturer, Israel Academy of Sciences & Humanities (2001)
The Holweck Medal and prize from British and French Physical Societies (2003)
Fellow of the Institute of Physics (UK) (2003)
Doctor Honoris Causa of the "Freie Universität Berlin" (Germany)(2003)
Doctor Honoris Causa of the Georgia Tech Institute (USA) (2006)
Doctor Honoris Causa of the École polytechnique fédérale de Lausanne (2007)
Price Roberval (avec P. Houdy et M. Lahmani) (2008)
Humboldt Research Fellowship (Germany) (2009)
Member of Academia Europaea (2010)
Foreign Member of the Royal Belgium Academy (2010)
Weizmann Women & Science Award (Israel) (2011)
Foreign Member of Hassan II academy of Sciences &Technics Morocco (2015)
Foreign Member of Romanian Academy (2017)
Member of the Académie des sciences d'Outre-mer France (2020)

- National Orders

Grand officier dans l'Ordre National de la légion d'honneur (2018)
Commandeur dans l'Ordre National du Mérite (2011)
Officier dans l'Ordre des Arts et des Lettres (2013)
Médaille de l'Amitié de l'Etat vietnamien (2001)
Commandeur de l'ordre Aztèque de la République fédérale du Mexique (2018)
Médaille de l'Amitié de la Fédération de Russie (2020)

- Books

- **Houdy,** Philippe ; **Bréchignac,** Catherine ; **Lahmani ,** Marcel. (2006). *Les nanosciences : Tome 2, Nanomatériaux et nanochimie*. Paris : Belin, 732p. [Prix Roberval 2018]
- **Bréchignac**, Catherine. (2009). *N'ayons pas peur de la science*. Paris : CNRS Editions, 62 p.
- **Bréchignac**, Catherine. (2018). *L'irrésistible envie de savoir*. Paris : Cherche Midi, 240 p.
- **Bréchignac,** Catherine & **Benedetti,** Arnaud. (2019). *Le progrès est-il dangereux ? dialogue contre les idées reçues*. Paris : HumenSciences éditions, 171 p.
- **Bréchignac**, Catherine. (2020). *La sardine et le diamant : de l'utilité de l'ordre et du désordre !* Paris : Cherche Midi, 250 p.