

CURRICULUM VITAE

Jean-Marie Dubois

Born July 14, 1950 in Laxou (France); French citizen.

“Ingénieur” ISIN-PolyTech Nancy (1973), “Docteur 3^{ème} cycle” in Metallurgy (1975),

Doctor in Physics, National Polytechnic Institute of Lorraine (1981).

Scientist at CNRS from 1977 to 2015, Distinguished Director of Research since 2004, Director of Research Emeritus since July 2015.

Scientific adviser (part time) at Jožef Stefan Institute, Ljubljana, Slovenia since Oct. 2015.



Areas of scientific interest:

Metalurgy and condensed metals sciences.

Structure and Properties of Metallic Glasses and Liquid Alloys.

Science and Applications of Quasicrystals and Complex Metallic Alloys.

Keywords:

Non-crystalline alloys and compounds: *glasses, quasicrystals, liquid alloys.*

Structure: *diffraction, models, high-dim crystallography, numerical simulation.*

Formation and stability: *alloy design, phase transitions, phase selection and lattice complexity.*

Properties of quasicrystals: *electronic structure, heat transport, solid-solid adhesion, wetting, friction.*

Applications of quasicrystals & complex intermetallics: *mass production, powders and atomisation, coatings, sintering, application to energy savings, surfaces with reduced adhesion, 3D manufacturing of composites reinforced with quasicrystals.*

Education:

1972: University of Nancy, *Master 1 degree in natural sciences:*

- *Structural and mechanical properties of materials*

- *Mathematical principles of technology*

1973: Nancy Institute for Engineering Sciences, University of Nancy, *Master 2 degree in materials science*

1974: Diplôme d'Etudes Approfondies de Chimie Minérale et Métallurgie (*cannot be translated to English. This diploma does not exist anymore*).

22.10.1975: PhD thesis in Physics:

Study of the ϵ phase in Fe-C and Fe-X-Si melt spun alloys

29.04.1981: State doctorate in Physics with honours, National Polytechnic Institute of Lorraine (this degree, which could last for many years, does not exist anymore in France)

Study of the structure and hyperfine magnetic properties of amorphous transition metal-metalloid alloys.

Career:

1974 - 1975 Young Scientist, French Ministry of Defense.

01.10.1977 Permanent position as junior fellow of CNRS.

01.10.1981 Promotion to « chargé de recherche 1st class » at CNRS.

1982 - 1983 Visiting Scientist at the Cavendish Laboratory and fellow of Churchill College, University of Cambridge (U.K.).

01.10.1985 Director of Research at CNRS, 2nd class.

01.10.1996 Director of Research at CNRS, 1st class.

01.10.2004 Distinguished Director of Research at CNRS, rank A.

01.02.2012 Distinguished Director of Research at CNRS, rank B.

15.07.2015 Director of Research Emeritus at CNRS, retired from public service.

20.10.2015 Scientific advisor (part time), Jožef Stefan Institute, Ljubljana, Slovenia.

2017-2018 Vice-President, Science Academy of Lorraine (www.als.univ-lorraine.fr). Unfortunately, this web site is in French only).

01.2019-01.2022 President, Lorraine Academy of Sciences.

Short term stays abroad (2 weeks to 2 months):

Research Centre Budapest (Hungary), Tech. Uni. Wien (Austria), Dalian Uni. Tech., Dalian (China), NIMS Tsukuba and NIRIM Sendai (Japan), Iowa State Uni., Ames (USA), Uni. Fed. Paraíba, Joao Pessoa (Brazil).

Major management responsibilities:

- 1978-today: PhD supervisor of **32** doctor and **18** master students. Partner or principal investigator in **42** collaborative projects with industry in France and Europe.
- 1985-2000: Founder and leader of a research group dedicated to Non-Crystalline Solids (*depending on the year, about 10 permanent staff and 10 PhD students*).
- 1989-1993: Manager of the CNI/MAT project (intensive computing in materials science), (*120 participants from 12 French laboratories*).
- 1992-1999: Director of a French priority program on quasicrystals and complex compounds (*up to 130 scientists in 30 French laboratories*).
- 1995-2000: Scientific Director of the Materials Engineering Centre at Ecole des Mines de Nancy (*220 persons*).
- 2001-2004: Director, Lab. of Materials Science and Engineering, Ecole des Mines, Nancy (*90 staff members*).
- 2001-2005: Co-ordinator of Brite-Euram project n° 5188 (1992-1995) & Growth 2000 'Smart Quasicrystals'.
- 2003-2012: Project leader for the foundation and building of Institut Jean Lamour in Materials-Metallurgy-Nanosciences-Plasmas-Surfaces (*total budget: 130 M€, 28 400 m²*).
- 2004-2015: Member of the working group and bureau of the MIPI (Innovative Materials-Intelligent Products, now called Materialia) competitiveness cluster. Chairman of the Strategy Council of Materialia.
- 2005-2010: Co-ordinator of the CMA (Complex Metallic Alloys) European Network of Excellence with 20 partners in 12 European Countries (*345 scientists, 60 PhD students, budget: 7.3 M€ over 5 years*).
- 2005-2012: Founding director of Institut Jean Lamour (*550 staff members, annual budget 21 M€*), a joint institute between CNRS and the University of Lorraine (<https://ijl.univ-lorraine.fr/le-laboratoire/presentation/>).
- 2012-2015: Chairman Section 15 "Solid-state chemistry – nanomaterials – processing" of CoNRS (professional chamber in charge of the evaluation and ranking of all CNRS scientists in this area).
- 2014-2015: Director in charge of the coordination of research in the area of nanosciences and nanomaterials for the North-East regions of France (GDR C'Nano GE).
- 2014-2015: Leader and French director of a joint international laboratory between Institut Jean Lamour and Jožef Stefan Institute on Push-Pull alloys.
- 2015-today: PhD supervisor and professor, Jozef Stefan International Postgraduate School, Ljubljana and scientific advisor, Jozef Stefan Institute, Ljubljana, Slovenia.

Authorship:

Author of more than **440** scientific documents (articles in refereed journals, proceedings papers and patents, books, reports, etc., > 10000 citations, h=50, i10>200 in Google Scholar), **19** book chapters, **8** books as editor and **2** monographs, **14** patents (+ 36 international extensions) in solid-state physics, materials science and applications of quasicrystalline materials and complex metallic alloys. Plenary lecturer or invited speaker at more than **190** international conferences and **130** seminars.

Honours and Awards:

- Overseas Fellow of Churchill College, University of Cambridge, U.K. (1982-1983).
- Jean Rist Award, French Materials & Metallurgy Society, Paris (1983)
- CNRS Bronze Medal (1984).
- Grand Prix Aluminium Péchiney, Académie des Sciences, Paris (1986).
- IBM Materials Science Award (1987).
- Permanent Invited Professor, Dalian University of Technology, China (*since 1997*).

Honorary member of the Bolivian Society for Sciences (*since 1998*).
 Xinghai Friendship Award for Foreign Experts, China (*1999*).
 Yves Rocard Prize, French Physical Society (*1999*).
 Doctor Honoris Causa, Iowa State University, USA (*since 2000*).
 STA Fellowship, Japan (*2001*).
 Scientist of the Year 2005 in Lorraine, Le Nouvel Economiste (*2005*).
 Chevalier dans l'Ordre des Palmes Académiques, French Ministry of Higher Education (*2006*).
 Doctor Honoris Causa, Federal University of Paraiba, Brazil (*since 2006*)
 Robert Franklin Mehl 2007 Lecturer of the TMS, USA (*2007*).
 Associate member of Academy de Stanislas, Nancy (*since 2008*).
 Member of Lorraine Academy of Sciences, 1st section: mathematics, physics & chemistry (*since 2009*).
 Honorary member of Jožef Stefan Institute, Ljubljana, Slovenia (*since 2011*).
 Golden Medal, City of Nancy, France (*2012*).
 Honorary International Chair Professor, National Taipei University of Technology, Taiwan (May 2012-April 2015).
 Permanent invited professor, Jožef Stefan International Post-Graduate School, Ljubljana, Slovenia (*since 2014*).
 Invited professor, Tohoku University, Sendai, Japan (*Nov.-Dec. 2014*).
 Science Prize of the International Union of Vacuum Societies (IUVSTA) (*2016*).
 Fray International Sustainability Award of Flogen SA, <http://www.flogen.org/sips2016/dubois.php> (*2016*).
 Fellow of the European Academy of Sciences, Materials Science Division (*since 2018*)
<https://www.eurasc.eu/members/>.
 Corresponding Member of the Slovenian Academy of Engineering (*since 2019*)
<https://www.ias.si/corresponding-members>.
 Medal of the Metropolitan Community of Nancy (Dec. 14, 2019).
 Fellow of Vebleo, <https://vebleo.com/vebleo-recognitions/> (*2022*).
 Fellow of the French Catholic Academia, <https://academiecatholiquedefrance.fr/> (*since 2022*).
 Stoddart International Scientific Award, Flogen Star Outreach, Phuket, Thailand (Nov. 29, 2022)
<https://www.flogen.org/?p=45>.

The “Jean-Marie Dubois Award”, administrated by Iowa State University, USA, is presented every three years to anyone “having significantly contributed to the advancement of the science of quasicrystals within the ten years preceding the award”. Since its creation in 2005, it was attributed to seven colleagues from Tohoku University, ETH-Zürich, CNRS Grenoble, Ben Gourion University and Chuo University, University of Bratislava, and Iowa State University.

Organisation of international conferences and meetings:

1987: Euroconference on Quasicrystals, Grenoble (*120 participants, with C. Janot*)
 1888: French Colloquium on Quasicrystals, Nancy (*100 participants*)
 1992: CNI/MAT 92 International workshop on Parallel Computing and Distributed Resources in Materials Science, Nancy (*150 participants; with F. Montoya and H. Bégorre*).
 1995: 5th International Conference on Quasicrystals, Avignon (*300 participants; with Françoise Cyrot-Lackmann*).
 1996: International Workshop on Aperiodic Structures, Krakow (*120 participants; with Janusz Wolny*).
 1996: 1st Intern. Conference on New Horizons of Quasicrystals, Ames, Iowa, USA, (*100 participants; with Alan Goldman, P.A. Thiel and D. Sordelet*).
 1997: Fall Meeting of the French Metallurgy Society, Paris (*400 participants*).
 1998: MRS Fall Meeting 1998 Symposium on Quasicrystals, Boston, USA (*160 participants; with P.A. Thiel, A.P. Tsai et K. Urban*).
 2003: MAI 2003 Intern. Conference on Metallurgy, Arts and Informatics, Nancy (*80 participants; with J.C. Duriez, J. Hardy et M. Thebault*).
 2003: French-German Colloquium on Quasicrystals, Nancy (*110 participants; with V. Fournée and H.-R. Trebin*).
 2005: Kick-off meeting of the CMA Network of Excellence, Luxemburg (*140 participants*).
 2009: 1st Intern. Conference on Complex Metallic Alloys, Nancy (*150 participants*).
 2011: 1st World Materials Perspectives Summit, Nancy (*300 participants*).
 2014: Les Cristaux de demain dans notre quotidien, 2014 Meeting of Lorraine Sciences Academy.
 2015: 2nd World Materials Forum, Nancy (chairman of the scientific board).

- 2015: MRS Brazil Annual Meeting, Symposium AA: Complex metallic alloys: a new frontier in solid state science (*with D. Cavalcante, S. de Barros and J. Guedes de Lima*).
- 2015: SIPS 2015, Symposium on The science of surfaces and interfaces, fundamentals and sustainable applications, Cancun (*with V. Fournée and E. Gaudry*).
- 2016: after retirement from CNRS and up to present, I have organised several meetings either at international level in the continuation of the previous ones (SIPS 2017 Cancun, 2018 Rio de Janeiro, 2019 Cyprus, 2022 Phuket), or locally in the frame of my membership of the Lorraine Sciences Academy.

Major research achievements:

- First study of the hcp Fe-C(-Si) ϵ -phase (1977)
- Nanostructuring model of transition metal-metalloid glasses (1981)
- Discovery of the first Al-based metallic glasses, patent (1982)
- Chemical twinning model adapted to the atomic structure of transition metal-metalloid glasses (1984)
- First, preliminary crystal model of Al-Mn quasicrystals based on neutron diffraction data (1986)
- First *in situ* study of the reversible liquid-quasicrystal transition in Al-Cu-Fe alloys (1986)
- First patent on potential applications of quasicrystals (1988)
- Study of the low thermal conductivity of quasicrystals, application to thermal barriers, patent (1991)
- First determination of the low friction coefficient of quasicrystals (1992)
- First attempts to produce quasicrystals at industrial scale – 1000kg/day (1992-94)
- Two-colour symmetry of Penrose tilings, application to large unit cell approximants (1993)
- Systematic investigation of the electronic partial densities of states in complex metallic alloys (1994-2010)
- Experimental and theoretical investigation of the wetting and friction properties of complex metallic alloys; correlation to partial densities of states and to crystal complexity (1996-2011)
- First systematic investigation of the surface energy of complex metallic alloys (CMA) (2004-06)
- Potential applications of CMA to vacuum and aerospace technologies (2001-2011).
- Re-interpretation of the transport and adhesion properties of Al-based complex intermetallics in terms of self-organised criticality (2011-present).
- Systematic investigation of Push-Pull alloys defined as complexity amplifiers in metal systems (2015-present).

Major management achievements:

- Foundation of the ‘Non-crystalline materials’ research group in Nancy (1983-2001), now transformed by V. Fournée into ‘Surfaces and metallurgy’ group (2002-present).
- Creation and directorship of the French research initiative on quasicrystals, with about 30 laboratories on board (1992-99).
- Creation (with K. Urban and L. Schlabach) and scientific coordination of the European Network of Excellence dedicated to Complex metallic alloys (budget: 7.3 M€, up to 450 participants, 2003-2011).
- Foundation and directorship of Institut Jean Lamour (Nanosciences, surfaces, metallurgy and plasmas), 500 members, and coordination of the construction of a new building (total budget: over 130 M€) (2003-2012).
- Chairman of “section 15: solid state chemistry, nanomaterials and processing” of the National Committee for Scientific Research, in charge of advising the Chemistry Institute of CNRS about recruitments and promotions and of evaluating the activity of the scientific staff (400 scientists, 25 research units) in its area of expertise (apparently, I was the first metallurgist to occupy this position), (2012-2015).
- Vice-chairman and Chairman of Lorraine Academy of Sciences (2015-today).

Short list of 10 selected publications:

1. **A model of the structure of metallic glasses based on chemical twinning;** J.M. DUBOIS, P.H. GASKELL, G. LE CAER *Proc. Roy. Soc. Lond. A402, (1985), 323-357.*
2. **Neutron and X-ray single crystal study of the Al-Pd-Mn icosahedral phase;** M. BOUDARD, M. de BOISSIEU, C. JANOT, G. HEGER, C. BEELI, H.U. NISSEN, H. VINCENT, R. IBBERSON, M. AUDIER, J.M. DUBOIS *J. Phys. : Cond. Matter, 4 (1992) 10149-168.*
3. **Electronic distribution of states in crystalline and quasicrystalline AlCuFe and AlCuFeCr alloys;** E. BELIN, Z. DANKHAZI, A. SADOUC, Y. CALVAYRAC, T. KLEIN, J.M. DUBOIS *J. Phys.*

Cond. Matter, **4** (1992) 4459-4472.

4. **Application of quasicrystalline alloys to surface coating of soft metals**; J.M. DUBOIS, S.S. KANG, Y. MASSIANI *J. Non Cryst. Solids*, **153-154** (1993) 443-445.
5. **Useful Quasicrystals**; J.M. DUBOIS, *World Scientific, Singapore* (2005), 470 pages.
6. **Wetting of aluminium-based complex metallic alloys**; E. BELIN-FERRÉ, J.M. DUBOIS, *Special issue of Zeitschrift für Metallkunde in the Honor of Knut Urban, Int. J. Mat. Res.* **97-7** (2006) 985-995.
7. **Complex Metallic Alloys, Fundamentals and Applications**; Eds. J.M. DUBOIS, E. BELIN-FERRÉ, *Wiley (Weinheim, 2010)*, 409 pages.
8. **Properties, and Applications of Quasicrystals and Complex Metallic Alloys** ; J.M. DUBOIS, *Chemical Society Reviews* **41** (2012) 6760-6777.
9. **Friction and solid-solid adhesion on complex metallic alloys**; J.M. DUBOIS, E. BELIN-FERRÉ, *Sci. Tech. Adv. Mater.* **15** (2014) 034804 (20pp).
10. **Self-lubricating, low-friction, wear-resistant Al-based quasicrystalline coatings**; B. A. SILVA GUEDES de LIMA, R. MEDEIROS GOMES, S.J. GUEDES de LIMA, D. DRAGOE, M.-G. BARTHES-LABROUSSE, R. KOUITAT-NJIWA, J.M. DUBOIS, *Sci. Techn. Advanced Mat.*, **17-1** (2016) 71-79.

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