Georges MARTIN

GEORGES MARTIN

Born May 28 1940, married, 2 children, 4 grand children.

Titles:

- 1963	"Ingénieur Civil des Mines" (*École des Mines de Paris, France*);
- 1964	MS in Nuclear Metallurgy *(Orsay-Saclay; Pr. P. Lacombe)*;
- 1965	MS in Solid State Physics *(Orsay; Pr. J. Friedel);*
- 1973	"Docteur es Sciences Physiques"[a] *(Orsay)*;
- 1995	"Research Director" at CEA[b];
- 1998	Member of Academia Europaea.

Positions

- 1964 / 84	Research Scientist, Physical Metallurgy, *CEA Saclay, France*;
- 1984 / 88	Head of "Centre de Chimie Métallurgique", *CNRS, Vitry, France*;
- 1988/2002	Head of the Physical Metallurgy Lab. (SRMP[c]), *CEA Saclay*;
- 2001/2005	Head of CPR[d] "Precipitation";
- 2002/2010	Scientific advisor by the Haut Commissaire à l'Énergie Atomique, CEA Head Quarter.

Field of research:

Physical Metallurgy (experiments, theory and computer modeling from the atomic scale up)

- Solid-state diffusion and diffusion-controlled kinetics;
- Materials under irradiation (fundamentals of-): microstructural evolution, phase instability, non equilibrium segregations, plasticity; I introduced the concept of ***''Driven alloys''*** and applied it to phase stability under irradiation, under plastic straining, friction and wear; various applications to nuclear materials (swelling of steels, stability of brazed joints, metallurgy of neutron absorbing alloys in control rods…), mechanical alloying (finding new processing routes for special compounds), wear of swift trains wheels (French TGV);
- Miscellaneous: crystal growth, corrosion, solute hardening, solid-state amorphyzation, metallurgy of an icosahedral phase, stability of INVAR alloys and of mixed phosphides.

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[a] *Older form of PhD in France;*

[b] *CEA: French Atomic Energy Commission;*

[c] *SRMP: Service de Recherches de Métallurgie Physique;*

[d] *CPR "Precipitation": joint research program on precipitation phenomena with CNRS, former ARCELOR, former PECHINEY & CEA as members.*

This resulted in more than 240 publications and reports (list below)

Teaching:

- 1975/95: MS degree "Metallurgy and Materials" *(U.Paris Sud Orsay & Saclay):* cohesion, elasticity, dislocations, diffusion, phase transformations, irradiation effects...
- 1996: Co-organizer of the EDF-INRIA-CEA school on computer modeling, devoted to "Modeling Materials from the Atomic Scale" : lectures on "Solid State Kinetics";
- 1998/2001: MS "Solid State Physics" *(U.Paris Sud Orsay) :* "Physical Metallurgy";
- Few weeks courses on: Materials under irradiation (1980, *Chinese Academy of Sciences & CEA, Pekin);* Solid State kinetics (1993, *U.Paris Sud Orsay*), Solid state diffusion and kinetics (2002, *Northwestern University*);
- Many advanced courses at summer schools (CNRS, NATO and others), such as: Aussois, Les Houches, Trieste, Rhodos, Viña del Mar (Chili), Urbana; topics covered "solid state precipitation", "non linear diffusion", "driven alloys", "nucleation", "surfaces and interfaces", "materials under irradiation"…

Supervision of PhD thesis : 18 students among whom 3 have University carriers (U of I at Urbana Champaign, U Deakin Australia, INP- Grenoble France), 5 are research scientists at CEA (basic science or technology), 2 are researchers at CNRS, 4 have industrial carriers (EDF, ARCELOR-MITTAL, scientific instruments, finance).

Invited lectures : (full list below). Among these, six Physical Metallurgy Gordon Conferences (Grain boundaries, Diffusion, Segregations, Phase transformations, Irradiation, Far from equilibrium processing), each of the five yearly PTM (Phase Transformation in Metals) initiated in 1981, the last of which was a plenary lecture in Avignon 2010 ("Driven Alloys"), several MRS and TMS annual meetings, the last of which was a keynote lecture at TMS 2011 SanDiego ("Solid-state diffusion and transformation kinetics"). Invited lectures were also given in several Academic centers, such as: Academia Sinica -Pekin, ISS Bangalore -India, U. of Tokyo, in the US at U. of I at Urbana Champaign, U. Northwestern, U. of California at Berkeley, MIT Boston, ITP at UCSB, in Germany at KFA Jülich, HMI Berlin, U. of Göttingen, and in France… Invited lectures at industrial research centers include IBM Yorktown Heights, LLNL, KFA Karlsruhe and in France, EDF-Renardières, IRSID in Metz (steel industry). I contributed to two DOE BES prospective meetings.

International cooperations:

Visiting laboratories abroad:

- 1970 / 71: *University of Illinois*, Urbana, Dep^{t} of Physics (1 academic year with Pr. D. Lazarus).
- 1975: *IBM Yorktown Heights* (2 weeks lecturing together with P. Benoist, on grain boundary diffusion);
- 1980: *Academy of Science, Pekin*, China : 3 weeks lectures on materials under irradiation.
- 1981: *MPI Stuttgart*, Pr. K. Urban.
- 1981-82: *University of Trento* in Povo, Italy: several visits with Pr. G. Jacucci (Numerical Statistical Physics);
- 1984 & 96: *Institute for Theoretical Physics, UCSB*: Seminars on: (84) "Interface between Theoretical Physics and Materials Science" & (96) “Grand Challenges in Numerical Materials Modeling".
- 1985 – 86: *Humboldt Prize :* 6 months in Germany: Hahn Meitner Institut, Berlin (Pr. Wollenberger), KFA Jülich (Pr. Schilling) and University of Göttingen (Physical Metallurgy, Pr. Haasen);
- 1988/2011: *Northwestern University, Evanston USA*, several 1 to 3 months visits: collaboration with Pr D. Seidman, on “Solid State Kinetics from the Atomic Scale up”;
- 1994: *Indian Institute of Science, Bangalore, India*: Pr G. Ananthakrishna : 2 weeks seminar on “Non Linear Phenomena in Materials Science” ;
- 2002 & 04: *DOE-BES: seminars* on Advanced Computer Materials Modeling: irradiation effects;
- 2004: *Lawrence Livermore National Laboratory*; Pr. Tomas Diaz de la Rubia: 2 weeks on Computer Modeling in Materials Science;
- 2005 / 09: *Tokyo, Japan,* Pr. Kinoshita: consulting with the cross-disciplinary program “NXO” (Oxides for nuclear applications), 4 seminars.

Foreign long-term visitors:

- 1981: K. Urban, KFA Jülich, Germany;
- 1988: W. Johnson, U. of Virginia, Charlottesville;
- 1989: F. Haider, U of Ulm, Germany;
- 1998: C. Abromeit, HMI Berlin, Germany.
- 1992-2002: Pr. V.G. Vaks (several one month stays), Kurchatov Institute, Moscow.

Books and Scientific Magazines:

Editor (principal) of "Surfaces and interfaces in metallurgy" (*in French*, summer school of Physical Metallurgy) Trans. Tech. (1975);

Editor (together with L. Kubin) of "Non linear phenomena in materials science" vol I, II, III: Trans. Tech. (1987; -92; -95);

Associate editor of *Progress in Materials Science* (Pergamon 1987-1995);

Associate editor of *Applied Physics Letters* (1997-2000)

Associate editor of *Materials Science Forum* (1997-2002)

Scientific committees:

- *CNRS:* “Comité national” (1983-86), and (1985-) evaluation committees of several CNRS Materials Science laboratories (Dijon, Rouen, Strasbourg, Nancy, Poitiers, Marseille, Toulouse, Caen, CNRS-ONERA);
- *AERS:* Evaluation committee of SIMAP, Grenoble (2010);
- *CEA*-Nuclear Reactor Division (1998 - 2000);
- *CPR* “SMIRN” (2003-06): joint research program between CNRS-EDF-CEA on metallic materials under irradiation;
- *CPR* “ISMIR” (2003-06): joint research program between CNRS-CEA on iono-covalent materials under irradiation;
- *CPR* “ODISSEE” (2011-): joint research program between CEA, CNRS, AREVA, EDF and Mécachrome, on oxide dispersed steels.

Scientific advisory committees of

- former PECHINEY (aluminum industry), 1989-91;
- former USINOR => ARCELOR (steel industry) 1998-2004;
- Max Planck Institut Düsseldorf (MPI für Eisen Forschung 2000-2005);

Awards

- 1985 Alexander Von Humboldt Stiftung Prize;
- 1992 Prize from Académie des Sciences;
- 1997 Portevin Medal (SF2M[e]);

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[e] *SF2M: French Society for Metals and Materials*

- 1998 Knight of “Ordre National du Mérite”;
- 1998 Member of Academia Europea (section: Physics and Engineering);
- 2001 Great Medal of SF2M;
- 2002 “Eshbach visiting Scholar” (Northwestern University);
- 2005 First Rhine-Rhur International Materials Award 2005;
- 2006 ‘‘Eshbach visiting Scholar’’ (Northwestern University);

Member of:

- Société Française de Physique & European Physical Society;
- Société Française de Métallurgie et Matériaux (SF2M);
- The Institute of Metals (up to 2002);
- Materials Research Society;
- TMS.

Selected publications (by topic)

I. *SOLID STATE DIFFUSION*

I.1 Autodiffusion au joint de grains de bicristaux d'argent soumis à une pression hydrostatique
(Grain boundary self diffusion under high pressure in silver)
G. MARTIN, D.A. BLACKBURN, Y. ADDA, Phys. Stat. Sol. **23** (1967) 223

I.2 Atomic model for grain boundary and surface diffusion
P. BENOIST, G. MARTIN, Thin Solid Films **25** (1975) 181

I.3 Measurements of grain boundary diffusion
G. MARTIN, B. PERRAILLON, in "Grain-boundary structure and kinetics" ASM (1980) 239

I.4 Interdiffusion in concentrated quaternary Ag-In-Cd-Sn alloys, modeling and measurements
C. DESGRANGES, F. DEFOORT, S. POISSONNET and G. MARTIN, Defect and Diffusion Forum **143-147** (1997) 603.

I.5 The atomic mobility in Cahn's diffusion Model
G. MARTIN, Phys. Rev., **B41** (1990) 2279

I.6 Self-consistent formulation of configurational kinetics close to equilibrium: the phenomenological coefficients for diffusion in crystalline solids
M. NASTAR, V. YU DOBRETSOV, G. MARTIN, Phil. Mag. **A80** (2000) 155-184.

I.7 Coupled relaxation of concentration and order fields in the linear régime
BELLON and G.MARTIN, Phys. Rev. **B66** (2002) 184208

I.8 A diffuse interface model for the interfacial transfer coefficient
G. MARTIN, Acta Materialia, 53 (2005) 2629-2632

II. *SOLID STATE KINETICS*

II.1 The mechanism of morphogenesis in a phase-separating concentrated multicomponent alloy:
ZUGANG MAO, C.K. SUDBRACK, K.E. YOON, G. MARTIN and D. SEIDMAN,
Nature Materials, **6**, 3 (2007), 210-216

II.2 The theories of unmixing kinetics of solid solutions
G. MARTIN, in "Solid state phase transformations in metals and alloys",
Editions de Physique, Orsay, France (1980) 337

II.3 Kinetic Monte Carlo Method to Model Diffusion Controlled Phase Transformations in the Solid State
G. MARTIN and F. SOISSON, in *Handbook of Materials Modeling* (Sidney Yip ed., Springer Netherland, 2005) 2223-2248.

II.4 Monte-Carlo computation of clusters free energies in the Ising model: a test for the validity of the capillarity approximation
G. JACUCCI, A. PERINI, G. MARTIN, J. Phys. A : Math. Gen. **16** (1983) 369 ; (II) , Phys. Rev. **B29** (1984) 2689

II.5 Effects of the Interaction between Order Parameter and Concentration on the Kinetics of Alloy Ordering
V.YU. DOBRETSOV, G. MARTIN, F. SOISSON and V.G. VAKS, Europhysics Letters, **31** (1995) 417-422.

II.6 Monte Carlo Simulations of Copper Precipitation in Dilute iron-copper Alloys during Thermal Ageing and under Electron Irradiation
F. SOISSON, A. BARBU and G. MARTIN: Acta Metal. and Mater., **44** (1996) 3789.

II.7 A Monte Carlo study of B2 ordering and precipitation via vacancy mechanism in BCC lattice
M. ATHENES, P. BELLON, G. MARTIN and F. HAIDER, (I) Acta Mater. **44** (1996) 4739 ;
(II) Phil. Mag. **A 76** (1997) 565 ; (III) Acta mater. 48 (2000) 2675.

II.8 Monte Carlo simulations of the decomposition of metastable solid solutions : transient and steady state nucleation kinetics
F.SOISSON and G. MARTIN, Phys. Rev.**B 62** (2000-I) 203-214.

II.9 Kinetic features of phase separation under alloy ordering
V.YU. DOBRETSOV, V.G. VAKS and G. MARTIN, Phys. Rev., **B54** (1996-I) 3227.

II.10 Computer simulation of diffusional phase transformations: Monte Carlo algorithm and application to precipitation of ordered phases
T.A. ABINANDANAN, F. HAIDER and G. MARTIN, Acta Mater. **46** (1998) 4243-4255.

II.11 Ordering and phase separation in Ni-Cr-Al : Monte Carlo simulation vs. three dimensional atom probe
C. PAREIGE, F. SOISSON, G. MARTIN and D. BLAVETTE, Acta mater **47** (1999) 1889-1899.

II.12 Amorphization by solid-state diffusion in granular systems
E. GAFFET, J.C. ANGLEZIO, J. BIGOT, G. MARTIN, J. Less Comm. Metals **140** (1988) 49.

II.13 Reactive solid state dewetting
L. SCHMIERGELD-MIGNOT, P.J.A. MOLINÀS-MATA, S. POISSONNET and G. MARTIN
Phil. Mag. Letters, **80** (2000) 33-40.

II.13 Precipitation kinetics of Al_3Zr and Al_3Sc in aluminum alloys modeled with cluster dynamics
E. CLOUET, A. BARBU, L. LAE and G. MARTIN, Acta Materialia, **53** (2005) 2313-2325.

II.14 Reconciling the Classical Theory of Nucleation and Atomic Scale Observations and Modeling
G. MARTIN
in *Solid-Solid Phase Transformations in Inorganic Materials 2005,* Edited by Howe et al, TMS , pp 291-299.

II.15 Driving force and mobility for microstructural evolutions : the rate of grains rotation across a grain boundary
G. MARTIN, Phys. Stat. Sol.**b172** (1992) 121.

II.16 Sintering of crystalline solids: a new modelization technique
A. PAVLOVITCH*, G. MARTIN
1st Tohwa U^{tr} Int. Symp. on Slow dynamics in condensed matter; Fukuoka, Nov. 1991.

III. *MATERIALS UNDER IRRADIATION*

III.1 Considérations sur la relation entre le fluage sous irradiation et les dommages créés par l'irradiation en l'absence de contrainte (Relationship between irradiation creep and zero stress irradiation damage)
G. MARTIN, J.P. POIRIER, J. Nucl. Mater. 39 (1971) 93.

III.2 Instabilité des solides cristallins sous irradiation (Instability of crystalline solids under irradiation)
G. MARTIN, Phil. Mag. **32** (1975) 615.

III.3 Void lattices and other radiation induced periodic structures
G. MARTIN, J. de Physique Colloque **38** (1977) C7-419.

III.4 Modèle simple d'évolution de la microstructure des solides sous irradiation (Simple model for microstructural evolution under irradiation)
P. VALENTIN, G. MARTIN, Phil. Mag. A **46** (1982) 971.

III.5 Biais des dislocations dans les alliages dilués (Dislocation bias in dilute alloys)
P. VALENTIN, G. MARTIN, Phil. Mag. **51** (1985) 715.

III.6 The elimination of irradiation point defects in crystalline solids : sink strengths
N.V. DOAN and G. MARTIN, Phys. Rev. **B67** (2003) 134107.

III.7 Premières évaluations des dégâts d'irradiation par ions lourds de très haute énergie à GANIL
A. BARBU, G. MARTIN, M. TOULEMONDE, J.C. JOUSSET, C.R.A.S. 299, Série II, n°**8** (1984) 409.

III.8 The contribution of electronic energy losses to radiation damage in metallic materials
A. AUDOUARD, E. BALANZAT, A. BARBU, J. DEVAUD-RZEPSKI, C. DIMITROV, A. DUNLOP, J. DURAL, G. FUCHS, J.C. JOUSSET, D.LESUEUR, N. LORENZELLI, G. MARTIN, L. THOME, A.M. WACHE, Radiation Effects and Defects in Solids, **110** (1989) 113.

III.9 Influence of the cascade size on the amorphization of phosphide in Ni base filler metals
L. BOULANGER, P. BELLON, Y. SERRUYS, N.V. DOAN, G. MARTIN
J. Nucl. Mater. **191-194** (1992) 473- 477.

III.9 Kinetic model for equilibrium and nonequilibrium segregation in concentrated alloys under irradiation
Y. GRANDJEAN, P. BELLON and G. MARTIN, Phys. Rev., **B 50** (1994) 4228.

III.10 Microstructural kinetics in alloys undergoing transmutations: application to AIC neutron absorbers
C. DESGRANGES, G. MARTIN, F. DEFOORT, Mat. Res. Soc. Symp. Proc. **439** (1997) 401.

III.11 Dislocation pinning by small interstitial loops : a molecular dynamics study
D. RODNEY and G. MARTIN, Phys. Rev. Lett. 82 (1999) 3272 ;(II) Phys. Rev. **B 61** (2000) 8714 ;
(III) + Y. BRECHET, Mat. Sci. Eng. A 309-310 (2001) 198-202.

III.12 Interstitial cluster motion in nickel: a Molecular Dynamics study
N. V. DOAN, D. RODNEY and G. MARTIN, Defect and Diffusion Forum, **194-199** (2001) 43-48.

III.13 Dose, Flux, Fluence
G. MARTIN, Note technique CEA-SRMP **-** 97.83.

III.14 Les matériaux du nucléaire et l'irradiation (nuclear materials and irradiation effects)
G. MARTIN and D. LESUEUR in "Les matériaux du nucléaire", A. Zaoui et al Editors, Academy of Sciences, rst n°5 (TEC & DOC Paris, 2000), Chapter 1.

III.15 Enhanced Annealing of the Dislocation Network under Irradiation
D. MORDEHAI and G. MARTIN, Phys. Rev. B accepted (2011).

IV. *DRIVEN ALLOYS*:

Overview:
Driven Alloys

G. MARTIN and P. BELLON, Solid State Physics **50** (1996) 189.

IV.a *ALLOYS DRIVEN BY IRRADIATION*

IV.a1 Radiation induced precipitation in NiSi solid solutions : dose-rate effects
A. BARBU, G. MARTIN, Scrip. Met. **11** (1977) 771.

IV.a2 The contribution of dissipative processes to radiation induced solid solution instability
G. MARTIN, Phys. Rev. B**21** (1980) 2122.

IV.a3 Solid solutions under irradiation : I ; II ; III
R. CAUVIN and G. MARTIN, Phys. Rev. B **23** (1981) 3322 ; Phys. Rev. B **23** (1981) 3333 ; Phys. Rev. B**25** (1982) 3385.

IV.a4 Precipitate coarsening induced by point defect recombination in alloys under irradiation
K. URBAN and G. MARTIN, Acta Met. **30** (1982) 1209.

IV.a5 Phase stability under irradiation : Ballistic effects
G. MARTIN, Phys. Rev. **B30** (1984) 1424.

IV.a6 Irradiation induced formation of metastable phases, a master equation approach
P. BELLON and G. MARTIN, Phys. Rev. B **38** (1988) 2570.

IV.a7 Cascade effects in a non-equilibrium phase transition with metallurgical relevance
P. BELLON and G. MARTIN, Phys. Rev. B **39** (1989) 2403.

IV.a8 Cascade effect on respective stability of ordered phases in Ni4Mo under irradiation
P. BELLON and G. MARTIN, J. of the Less Com. Metals **145** (1988) 465-475.

IV.a9 Quantitative description of mixing with light ions
A. TRAVERSE, M.G. LE BOITE and G. MARTIN, Europhys. Lett. **8** (1989) 633-637.

IV.a10 Non equilibrium transitions in driven AB_3 compounds with FCC lattice : a multivariate master equation approach : F. HAIDER, P. BELLON and G. MARTIN, Phys. Rev. **B 42** (1990) 8274.

IV.a11 Cascade size effects on phase stability under irradiation: a stochastic description
P. BELLON and G. MARTIN, Radiation Effects and Defects in Solids, **113** (1990) 165.

IV.a12 Dynamical lattice model for binary alloys under radiation: mean field solutions and Monte Carlo simulations
E. SALOMONS, P. BELLON, F. SOISSON and G. MARTIN, Rev. **B 45** (1992) 4582.

IV.a13 Two-phase dynamical equilibria driven by irradiation in ordered alloys
SOISSON, P. BELLON and G. MARTIN, Phys. Rev. **B46** (1992) 11332.

IV.a14 Dynamical phase changes induced by point defect fluxes under irradiation
C. ABROMEIT and G. MARTIN, J. Nucl. Mater, **271 &272** (1999) 251-255.

IV.b *ALLOYS DRIVEN BY SEVERE PLASTIC STRAINING*

IV.b1 Transformations de phases et plasticité (Phase transformations and plasticity)
G. MARTIN, Ann. Chim. Fr. **6** (1981) 46.

IV.b2 Cavitation en volume dans des solutions binaires à base de Nickel fatiguées à haute temperature (Bulk cavitation in Ni base solid solutions under high temperature cyclic loading)
B. ARNAUD, R. Le HAZIF and G. MARTIN, Acta Met. **33** (1985) 1105.

IV.b3 Ball milling amorphization mechanism of NiZr alloys
E. GAFFET, N. MERK, G. MARTIN and J. BIGOT, J. of the Less Comm. Metals : **145** (1988) 251-260.

IV.b4 Ball milling induced amorphization in Ni_xZr_y : a parametric study
Y. CHEN, M. BIBOLE, R. LE HAZIF and G. MARTIN, Phys. Rev.**B48** (1993) 14.

IV.b5 Order-disorder transformation in Fe-Al under ball milling
P. POCHET, E. TOMINEZ, L. CHAFFRON and G. MARTIN, Phys. Rev., **B52** (1995) 4006-4016.

IV.b6 Taking advantage of the concept of Driven Alloys to study the wear of swift train wheels
Y. LE BOUAR, L. CHAFFRON, G. SAINT-AYES and G. MARTIN, Scripta Mater, **49** (2003) 985.

V. *MISCELLANEOUS*

V.1 Dodecahedral shaped quasicrystalline precipitates in dilute AlMn solid solutions:
K. YU ZHANG, J. BIGOT, J.P. CHEVALIER, D. GRATIAS, G. MARTIN and R. PORTIER
Phil. Mag. B **58** (1988) 1-13.

V.2 Incubation time and frequency of pitting of passive layers
G. MARTIN and B. BAROUX, Europhysics Letters **5** (1988) 629.

V.3 Influence of substrate induced misfit stresses on Miscibility Gap in Epitaxial Layers ; Application to III - V Alloys
F.C. LARCHE, W.C. JOHNSON, C.S. CHIANG and G. MARTIN, J.Appl.Phys. **64** (1988) 5251.

V.4 Chemical ordering in $Ga_xIn_{1-x}P$ semiconductor alloys grown by metallorganic vapor phase epitaxy
P. BELLON, J.P. CHEVALIER, G. MARTIN, E. DUPONT NIVET, C. THIEBAUT and J.P. ANDRE
Appl. Phys. Letters **52** (1988) 567.

V.5 Study of self-limiting oxidation of silicon nanoclusters by atomistic simulations
J. DALLA TORRE, J.L. BOCQUET, Y. LIMOGE, J.P. CROCOMBETTE, E. ADAM, G. MARTIN,
T. BARON, P. RIVALLIN and P. MUR, J. Appl. Phys. **92** (2002) 1084-1094.

V.6 Chemical disorder induced amorphization in NiZr2: a constant temperature - constant pressure molecular dynamics study combined with the tight binding approach
C. MASSOBRIO, V. PONTIKIS and G. MARTIN, Phys.Rev.Letters **62** (1989) 1142.

V.7 A study of phase stability in INVAR FeNi alloys by anomalous X-Ray scattering :
J.P. SIMON, O. LYON, F. FAUDOT, J. RZEPSKI, O. DIMITROV*, L. BOULANGER and G. MARTIN
in "Physical Metallurgy of controlled expansion Invar type alloys", K.C. Russell and D.F. Smith Editors, The Minerals, Metals and Materials Society, 1990, p. 51.

V.8 Antisite defects and non equilibrium phase transitions in intermetallics
G. MARTIN and P. BELLON, MRS Bulletin, **16** (1991) 33.

V.9 Modélisation numérique en Science des Matériaux de l'échelle atomique à l'échelle mésoscopique (Materials computer modeling form the atomic- up to the meso-scale)
G. MARTIN, A. PAVLOVITCH, Mem. Sci. Rev. Met. **89** (1992) 555

V.10 Relationship between the electronic structure and the precipitation of FeTiP in interstitial-free ferritic steels

R.P. GUPTA, G. MARTIN, S. LANTERI, P. MAUGIS and M. GUTTMANN
Phil. Mag. **A 80** (2000) 2393-2403.

V.11 Dislocation glide in model Ni(Al) solid solutions by molecular dynamics
E. RODARY, D. RODNEY, L. PROVILLE, Y. BRECHET and G. MARTIN
Phys.Rev. **B 70** (2004) 054111.

V.12 Atomic-scale study of dislocation glide in a model solid solution
L. PROVILLE, D. RODNEY, Y. BRECHET and G. MARTIN
Phil. Mag. **86**, 25-26 (2006), 3893-3920.

V.13 Nucleation problems in metallurgy of the solid state: recent developments and open questions
Y. BRÉCHET and G. MARTIN
Comptes Rendus Physique **7** (2006), 959-976.

V.14 Contribution to : ”*La Métallurgie*”, RST Nº 31, Academy of Sciences, Yves Quéré et André Pineau Editors, EDP, France, 2011.

Main scientific achievements

All of my work is motivated by developing basic science for materials technologies (nuclear and non nuclear).

1964-1977: Interfacial Diffusion

Grain-boundary (GB) diffusion was known to have a deleterious effect in the early nuclear fuel cladding (dispersion strengthened Mg) and, later, grain boundary electro migration was acknowledged to have a key role in the failure of micro-conductors in supercomputers. In this context, I measured two basic characteristics of grain boundary diffusion in a simple model metal, silver: the activation volume[1] and the effective valence[4], which measures the proportionality between the fluxes of atoms and of electrical charges. The measurements were performed on bycrystals, using radiotracer techniques, which implied very low activity measurements. The *activation volume* we measured pointed to a vacancy diffusion mechanism at the grain boundary (an unconventional idea in those days): this result got confirmed 20 years later in U. of Münster, in Germany. The *effective valence* we found was of the same sign as in the bulk, which ruled out some speculations in the literature on the possibility for hole conduction at the GB's.

The GB diffusion models used at that time were very rough (a high diffusivity slab of finite thickness), while electron microscopy and field ion microscopy in metals were revealing undisturbed crystalline atomic packing up to the contact surface between the adjacent grains, in metals. For this reason, we proposed, together with Dr. P. Benoist (Wigner medal 1996), a lattice model for surface and GB diffusion, where the fast diffusion paths are confined to the contact surface between the two crystals[9]. We could thus specify the physical meaning of the parameters used in the classical models.

I later extended the formalism of GB diffusion to alloys[17] and to phase boundaries[10], two cases of practical relevance, where interfacial equilibrium conditions must be handled with care.

Other work included measuring the activation volume for Na diffusion in NaCl (at U of I Urbana, Pr. D. Lazarus), confirming a positive relaxation volume of the Schotky pair[6], at variance with the best theoretical values of those days (the use of a linear approximation for the displacement to force ratio was at the origin of the error).

I also reformulated the rate of decay of capillarity waves, in the limit where adatom emission / absorption at surface steps is the rate controlling process, rather than surface diffusion from step to step (as postulated by Mullins in his famous work)[21].

1969-1984: High temperature irradiation effects

In the late 60's British scientists discovered irradiation induced swelling of stainless steel used as a cladding material in the Donrey fast reactor. The latter discovery triggered a worldwide interest. Swelling still raises problems in some core components of PWR's. As is often the case in nuclear technologies, this swelling phenomenon challenged materials science and engineering, since no macroscopic theory can account for it: one must link the atomic scale, where nuclear collisions are well described, to the time evolution of the strain tensor, from which engineers can handle structural mechanics computations. This, I found very appealing.

My first contribution in this field together with Jean-Paul Poirier, dealt with the plastic deformation in metals under irradiation: based on simple defect balances we pointed, for the first time, to the possibility of a creep rate proportional to square of the shear stress[2].

I then focused on more generic aspects of materials under *high temperature* irradiation, i.e. temperatures where the irradiation produced point defects can migrate distances large enough for a (quasi) stationary defect population to prevail in the solid. Such materials can be viewed as an open system sustained by external forcing (injection of defects) in some stationary state, the stability of which is not governed by thermodynamical potentials (an active field of research in the 70's).

My first attempt along this line, dealt with the formation of void- (or other defect clusters) lattices[13]. According to this work, the latter appeared as a result of the spatial instability of the stationary uniform defect population, provided the defect-defect physical interaction is taken into account in the coupled reaction-diffusion equations, which govern time evolution of the vacancy and interstitial concentration fields. The model predicted that such a patterning would occur beyond some critical irradiation flux threshold, which depends on temperature, a prediction, which was confirmed by A. Barbu in his PhD thesis work.

This finding supported a suggestion by Adda et al. that depending on the irradiation flux and temperature, diffusion under irradiation might drive the material in opposite directions (order/disorder, dissolution/precipitation, amorphization/crystallization…). A.Barbu[22, 31] showed that such is indeed the case for irradiation induce precipitation in undersaturated solid solutions (Ni-Si).

My model also gave a general argument to account for irradiation-induced instability of undersaturated solid solutions[28]. Vacancy-interstitial mutual annealing introduces a weak coupling between the concentration fields of the solute and of the two types of defects: provided that the couplings between solute and defects fluxes is properly accounted for ("inverse Kirkendal effect"), the latter may destabilize the solid solution. Together with R. Cauvin[26, 35, 36, 43, 54] we found evidence of such an effect in Al base solid solutions: the full spectrum of reaction to irradiation of many distinct solid solutions could be rationalized with the above argument, while constraint thermodynamics arguments failed to do so[27]. Potential consequences of the above mechanism on precipitate coarsening, or on the decomposition of INVAR alloys were explored together with K. Urban[44] and C. Abromeit[69], respectively.

The above formalism relied on the existence of stationary defect concentration fields, while the latter slowly evolve because of the microstructural evolution, which modifies the density of point defect sinks. Together with P. Valentin[47, 51, 62], we modeled the coupled slow evolutions of various components of the microstructure, by eliminating the fast variables (defect concentration fields), which revealed some unexpected features, such as transient swelling, or a mechanism for the incubation of swelling, etc… One difficult point in modeling microstructures under irradiation deals with the evolution of the dislocation network. I addressed this problem very recently with D. Mordehai, paying special attention to the "coordinated climb" of neighboring dislocation segments[231].

1984-1998 Driven alloys (for an overview, cf. ref. 166)

All the above models assumed that irradiation produces the point defects uniformly in space and time, while defects are produced in a correlated manner inside cascades, the size and density of which depends on the details of the slowing down of the irradiating particles. Moreover, cascades trigger local atomic mixing. From the theoretical viewpoint, cascades can be viewed as external noise imposed to the atomic configuration, with specific time and space correlation (at variance with thermal noise). A similar context prevails under sustained shear, such as during cyclic loading, materials processing by ball milling, etc… I suggested the analogy between the effects on phase stability, of irradiation and sustained shear in 1980[33].

Our first attempts failed to reveal any alteration of phase stability in Ni base binary solutions under high temperature cyclic loading, although an unexpected mechanism of bulk cavitation was found[64]. Several evidences of shear induced alteration of phase stability, such as precipitate dissolution in persistent slip bands or non-equilibrium segregations, were found by other groups, but were not rationalized with our ideas. Ball milling, on the other hand turned out to be more successful: we could define a "milling intensity" and demonstrate on model alloys (mainly FeAl and Ni_xZr_y compounds) that under milling, the alloy achieves a state (ordered or disordered, crystalline or amorphous), which depends on the milling conditions (intensity and temperature). The analogy with irradiation effects was established[137, 156]. Advantage could be taken of this analogy in several studies of practical impact: optimizing the processing route of dispersed oxide compounds for electrical contact[142] (among others), understanding the wear process of swift trains wheels[217], and more recently optimizing drug processing by milling (M. Descamp, AIP Conference Proceedings, Volume 982, 2008, 53-61).

Developing the theory of driven alloys spread on a long period of time. The effect of "ballistic mixing", i.e. the atomic mixing forced by nuclear collisions or dislocation glide during shearing, was first treated by simply superimposing forced atomic jumps to the thermally activated ones in a Cahn Hilliard type diffusion equation. The result was that the evolution of the solute concentration field is no more governed by the Gibbs free energy functional, but by a Lyapunov functional; the latter writes as the Gibbs free energy evaluated at an "effective temperature", which depends on the ratio of the forced to the thermal atomic jump frequencies[56]. This idea yields qualitatively and sometimes quantitatively corrects results[93].

We addressed the problem with increasing levels of sophistication:

a- The state of the compound is defined by a *uniform* order parameter, the value of which is governed by a the *deterministic* equation: single or multiple stationary states are found, depending on the forcing intensity and temperature, the *local* stability of which can be assessed[74,121].

b- The state of the compound is defined by a *field* of order parameter, the evolution of which is governed by time dependant Gingsburg Landau equation. Special care had to be devoted to the expression of the kinetic coefficient under purely thermal conditions. I proposed a mean field approximation, which treats thermodynamics and kinetics at the same level of sophistication[104]. Based on this model, several problems could be addressed: coarsening under irradiation, kinetic pathways for precipitate dissolution, revealing the key role, on top of the reduce temperature, of the forcing intensity[132, 143, 145]. A practical application of the above technique dealt with irradiation induced interfacial segregations, a key issue in stress corrosion cracking of core components[153, 184].

c- The above technique could incorporate "inverse Kirkendal effect" on top of ballistic mixing, yielding a unified treatment of both effects[166].

d- Keeping the homogeneous description, we addressed the *stochastic* aspect of the problem, based on a Fokker Planck or Kubo equation[85, 86, 90, 92, 98, 113]. From these treatments, we could propose phase diagrams of dynamical-equilibrium under irradiation for model compounds (FeAl and Ni_4Mo), several predictions of which have been later confirmed by experiment. E.g. the order disorder transition in FeAl, which is of second order shifts to first order under appropriate irradiation conditions[147], the extension of the stability domain of ordered structures in Ni_4Mo, varies with the size of the cascade, keeping the irradiation flux the same (experiments done in Argonne by Bellon et al. and in HMI by Banerjee et al.). Kinetic Monte Carlo simulations enriched the theoretical treatment[150].

One of the applications of the above ideas about dynamical equilibria and microstructural evolution under irradiation dealt with the surprisingly good irradiation resistance of brazing of common use in PWR's: the brittle Ni phosphides either amorphize or develop a dislocation network which makes them more ductile[126]!

On a more general level, the above results might be used to clarify the notions of dose, dose rate, flux, fluence, which are sometimes confusing in nuclear technologies: taking as a guide the medical meaning of a "dose" (the elementary ingestion of some drug), I proposed (up to now, without success) to name "elementary dose" the cascade (as defined by it's size and density); the "dose rate" is the number of doses per unit time (and per unit quantity of matter) and the "integrated dose" is the integral of the latter. As we demonstrated and observed, the effect of a given irradiation depends on the three above parameters[R5].

1994-... Configurational kinetics

As said above, driven alloys are such that two diffusion mechanisms are competing: a forced one, which is deduced from particle matter interaction, and the thermal one, which also operates in the absence of forcing. The reliability of modeling a kinetic pathway rests on the precision with which actual diffusion mechanisms are modeled. As we got involved in the field, most models were based on the kinetic Ising model, i.e. direct exchange diffusion mechanism and the same cohesive energy for the two components of the alloy, two features at variance of any metallurgical system: indeed, diffusion occurs because of vacancy jumps, and the alloy components have usually quite distinct cohesive energies, the latter scaling many of the vacancy properties (formation and migration energies). This was the driving force for revisiting the kinetic coefficient, which enters Cahn-Hilliard's diffusion equation. The expression we proposed, based on a broken bonds model, yields a unified description of configurational thermodynamics and kinetics, at the same level of sophistication[104]. Based on this model, we revisited many classical problems in solid-state kinetics, either using *Kinetic Monte Carlo* (KMC) simulations or various *mean-field approximation*s:

a- The realism of our KMC simulations has been assessed by comparing the precipitation of $Ni_3(Al,Cr)$ in a ternary model super alloy (NiAlCr) as observed by tomographic atom probe (TAP) and in our simulations[191]. In those days the improvement of the computing power, made it possible to run the real experiment and the virtual one on similar sample sizes. The quantitative and qualitative agreement between modeling and experiment was impressive. I improved the above study with D. Seidman, taking advantage of the recent explosion of the detection yield of Atom Probes. We could analyze a much greater number of precipitate nuclei, which revealed unexpected nuclei compositions and morphologies. The KMC simulations are based on first principle interatomic energies; the same parameters are used to compute the Onsager and diffusion matrices in the terminal solid solution. The origin of the unexpected features is demonstrated to be in the kinetic coupling among the fluxes of the alloy components, a coupling that is ignored by the classical models[227, 232].

b- More generic studies of kinetic pathways for the relaxation toward equilibrium were also made, based on KMC simulations. We could identify the impact of the vacancy diffusion mechanism on various parameters such as the kinetic percolation limit, the Kolmogorov-Johnson-Mehl-Avrami exponent, or on qualitative features such as the uniform versus localized ordering process[167, 173, 189], or the incubation time for precipitation[193].

c- Few problems with direct practical relevance could be addressed based on such a KMC technique: Cu precipitation in Fe[160], formation of niobium carbides in low alloy steels, where the transient formation of a non-equilibrium iron carbide was predicted[211].

The mean field approximation has been taken advantage of for revisiting basic problems of solid-state kinetics:

a- Computing the Onsager matrix coefficients from the spectrum of defect (vacancy[185] and later self interstitial) jump frequencies; Studying the coupled relaxation of the order and composition fields (the classical model, which ignore that both fields relax because of the very same vacancy jumps, omit a coupling term)[214, 157, 165]; Expressing the interfacial transfer coefficient as a kinetic excess quantity[129].

b- Based on the same technique as the mean field model, we could study precipitation complex alloy (Ag, In, Cd, Sn) undergoing transmutations, used as neutron absorber in PWR's. Because the model used is based on a sound diffusion mechanism, the parameterization only required a small number of interdiffusion measurements[175].

Studying precipitation phenomena, I focused on various aspects of the nucleation theories[32], in particular on the free energy of a nucleus. Together with G. Jacucci (U. Trento, Italy) we used computer calorimetry to compute the latter in the Ising model (2 and 3 D), with a great level of accuracy: we could evaluate the correction to the capillarity approximation for small nuclei[49, 57, 58]. The free energies so computed can be used in cluster dynamics models for nucleation and growth. A direct assessment of the technique was done for the precipitation of AlZr, which was simulated using the KMC technique as described above, and using cluster dynamics parameterized as just described. The agreement is very good at least in the dilute case[223]. This research allowed to clarify some points of the classical nucleation theory[224].

Miscellaneous

I did contribute to several studies which were underway in the laboratories I was the head of: metallurgy of quasi-crystals[79], surface treatments by LASER heating[70], interdiffusion induced amorphization[83, 97, 115], kinetic pathways in epitaxial growth[87, 88, 96,105], irradiation damage by swift ions[63, 109]…

The kinetics of morphological changes are fascinating, but difficult to phrase in general terms[16]: I addressed few questions such as the morphological stability of two phase super alloys with large precipitate volume fractions[81], the rate of grain rotation across a grain boundary[123], dewetting of a surface layer as a result of an interfacial reaction[196, 202, 206], the incubation time for corrosion pitting[82].

While the major part of my computer simulation work is based on Monte Carlo techniques, I devoted few years to using Molecular Dynamics to study atomistic aspects of crystalline plasticity: dislocation pinning by small self interstitial clusters and the unpinning mechanisms in irradiated model Ni[190, 199] and solute hardening in dilute Ni(Al) solutions[219, 225]. Both studies revealed features, which were not expected from continuum theories.

Managing research laboratories (1984-2002)

I had two very different experience of management: one at CNRS (1984-88), the other at CEA-Saclay (1989-2002).

At CNRS, the “Centre d'Études de Chimie Métallurgique” (Vitry sur Seine) was one of the earliest CNRS laboratories (50 years old), with about 60 scientists, 40 technical staff and 20 to 30 students. My main goal has been to stimulate a skill in modeling, in a community dominated by experimentalists, as well as forcing scientific communication among the teams.

At CEA, the Physical Metallurgy Laboratory (SRMP), which I was heading, underwent a deep renewal of people, because of the French retirement system. With 25 staff members, and 15 students, post-doc and visiting scientists, my main goal has been to keep and develop an expertise in the scientific basis for nuclear materials, at a time where such a field was temporarily outdated, and part of the team did work on problems like new routes of materials processing (mechanical alloying, electro deposition of High Tc superconductors...). Modeling from the atomic scale up has been the main achievement of that team; in particular, first-principle electronic structure computations were developed both for static and kinetic problems and provided the input parameters for atomic scale modeling. The cohabitation in the same small team of researches on very basic questions and researches on rather applied problems has been very stimulating, provided the communication among both sort of people could be maintained.
One of the major practical impacts of this expertise has been to introduce such techniques to the EDF research laboratory (EDF-Renardières, in the early 90’s).

Theses prepared under G. Martin’s supervision

[Student’s name (type of these): title of the thesis translated into English (president of the jury)]

- A. Badirou (1975-76, thèse de spécialité - Orsay): Epitaxial silver layers vapor deposited under vacuum;
- A. Barbu (1975-78, doctorat d'état ès sciences physiques - Nancy): Phase changes under irradiation: a contribution (Pr. Jouffrey);
- R. Cauvin (1976-81, doctorat d'état ès sciences physiques - Nancy): Experimental and theoretical study of solid solution instability under irradiation (Pr. Guinier);
- P. Valentin (1979-84, doctorat d'état ès sciences physiques - Paris VI): Microstructural evolutions under irradiation (Pr. Friedel);
- B. Joulia-Arnaud (1981-85, doctorat d'état ès sciences physiques - Paris VI): Microstructural evolution under high temperature cyclic loading in nickel base solid solutions (Pr. Poirier);
- E. Gaffet (1984-88, thèse de l'Université Paris VI, science des matériaux): Metastable phases produced by Laser heating or by solid-state interdiffusion (Pr. Fayard);
- P. Bellon (1985-88, thèse de l'Université Paris VI, science des matériaux): Constrained equilibria in materials science: a contribution (Pr. Friedel);
- M. Debuigne (1986-88, thèse École Centrale): Experimental study and modeling of Laser processing of TA6V alloys (Pr. Huetz);
- Ying Chen (1989-92, thèse de l'Université Paris XI, science des matériaux): Contribution to the physics of mechanical alloying (Pr. Philibert);
- F. Soisson (1990-93, thèse de L'Institut Polytechnique de Grenoble, science et génie des matériaux P. Bellon co-supervisor): Ordered compounds under irradiation, dynamical equilibrium phase diagrams and kinetic pathways (Pr. Joud);
- P. Maugis (1991-94, thèse de l'Université Paris XI, G. Blaise co-supervisor): Thin films of TiAl intermetallic compound produced by reactive interdiffusion (Pr. Philibert);
- D. Galy (1991-95, thèse de l'Université Paris XI, L. Boulanger co-supervisor): Amorphization of intermetallic compounds under ball milling (Pr. Revcolevschi);
- P. Pochet (1993-97, thèse de l'Université Lille, L. Chaffron co-supervisor): Phase changes under high energy milling (Pr. Foct);
- M. Athènes (1994-97, thèse de l'Université Paris VI, P. Bellon co-supervisor): Vacancy mediated diffusion in alloys and decomposition kinetics (Pr. Pétroff);
- C. Desgranges (1995-98, thèse de l'Université Paris XI): Understanding and predicting the evolution of neutron absorbing silver base alloys under neutron irradiation (Pr. Priester);
- D. Rodney (1997-2000, thèse INPG, Pr. Y. Brechet co-supervisor): Atomic scale modeling of dislocations (Pr. Friedel).
- D. Gendt (1998-2001, thèse Paris XI, F. Soisson co-supervisor): Experimental study and modeling of NbC precipitation in low alloy steels;
- H. de Monestrol (1998-2001, thèse INPG, Mme L. Mignot co-supervisor): Reactive dewetting in the solid state (Pr. N Eustathopoulos).
- E. Rodary (1999-2002, thèse INPG, co direction avec D. Rodney): Atomic scale modeling of dislocation glide in solid solutions (Pr. P. Guyot).

Invited talks at meetings (a selection):

Unpublished:

- Gordon conferences on Physical Metallurgy (1978, -82, -84, -88) and on "far from equilibrium material processing" (1995);
- Festschrifts in the honor of: Kirkendalll 1991, Balluffi 1993, de Fontaine 2002, Hillert 2004;
- Universities: USA (Urbana, Berkeley, ITP Santa Barbara, Brown à Rhodes Island, Northwestern, Perdue, Storrs); Germany (Göttingen, Mainz); Italy (Trento); Swiss (EPFL Lausanne); Belgium (Free U. Bruxelles); Holland (Amsterdam, Groningen);
- Research Centers: USA (Argonne, Oak Ridge, NIST, IBM Yorktown Heights, LLNL); Germany (KFA Jülich, HMI Berlin, KF-Karlsruhe), India (BARC Bombay, ISS Bangalore), China (Pékin), Japon (Tokyo: NXO program).

Main international meetings, published: Name of the meeting, location, (Title of the speech[ref])]

Les Joints de Grains (Grain boundaries), Ecole Polytechnique de Montréal, Canada, 1973 (Grain boundary electromigration as a tool for studying GB core structure[8]);

Les joints de grains dans les métaux (Grain boundaries in metals), Colloque International CNRS, St Etienne, France, 1975 (Grain boundary diffusion[12]);

L'ordre et le désordre dans les solides (Order and disorder in solids), Colloque International CNRS, Paris, France, 1977 (Void lattices and other radiation induced periodic structures[24])

Comportement sous irradiation des matériaux métalliques et des composants des coeurs des réacteurs rapides (Behavior under irradiation of metallic materials and core components of fast neutron reactors), Conférence internationale CEA, Ajaccio, France, 1979 (Alloy stability under irradiation[29]);

Int. Conf. on Radiation effects in breeder reactor structural materials, Scottsdale USA, 1977 (Fundamental aspects of the evolution of- and phase changes in metals and alloys under irradiation [23]);

Workshop on Solute segregation and phase stability during irradiation, Gatlinburg USA, 1978 (Radiation induced homogeneous precipitation in undersaturated solid solutions[26]);

Grain-boundary structure and kinetics, ASM seminar, Milwaukee USA, 1979 (Measurements of grain boundary diffusion[30]);

Phase stability during irradiation, Séminaire AIME, Pittsburgh 1980 (Dose-rates effects on solid solution stability[37]);

Int. Conf. on Solid-solid phase transformations, Pittsburg USA 1981(Effects of irradiation on phase stability and phase changes[39]);

Yamada Conf. V, Point Defects and Defects Interactions in Metals, Kyoto Japon, 1981 (Irradiation induced solid solutions instability[48]);

Effects of radiation on materials, ASTM, Scottsdale USA, 1982 (Cooperative effects in microstructural evolutions under irradiation: fundamental aspects[50]);

Third International Conference on Ion Beam Modification of Materials, Grenoble 1982 (Implantation, ion beam mixing and solid state solubility[55]);

Dimensional stability under irradiation, British Nuclear Energy Society Bristol 1983 (Synergistic effects during high temperature irradiation[51]);

Decomposition of alloys: the early stages, 2nd Acta-Scripta Metallurgica Conference 1983 (Phase stability under irradiation[59]);

Solute-defect interaction - Theory and experiments, International workshop, Kingston Canada, 1985 (Stability criteria for phases under irradiation[66]);

The relation between mechanical properties and microstructure under fusion irradiation conditions, International workshop Danemark 1985 (Alloys evolution under irradiation[67]);

Atomic transport and defects in metals by neutron scattering, International workshop Jülich Allemagne, 1985 (Saturation of irradiation induced precipitation[68]);

Int. Conf. on Vacancies and interstitials in metals, Berlin 1986 (Theoretical approaches to phase stability criteria under irradiation[75]);

Pattern, defects and microstructures in non equilibrium systems, NATO workshop, Austin USA 1987 (Stability criteria for phases under irradiation[76]);

Solid-state amorphizing transformations, Los Alamos USA, 1987 (Metastable phases formation under irradiation[80]);

Materials research society fall meeting, Boston USA, 1988 (Stochastic description of cascade size effects on phase stability under irradiation[98]);

First International Symposium on Swift Heavy Ions in Matter, Caen 1989 (Theoretical approaches of structural modifications induced by ion irradiation[111]);

Int. Symp. on Amorphization by Solid-State Reaction, Grenoble 1990 (Mechanical alloying : far from equilibrium phase transitions ?[108]);

Int. Conf. on the evolution of metals during irradiation, Muskoka Canada, 1992 (Phase stability and microstructural evolutions in concentrated alloys under irradiation[133]);

Statics and Dynamics of Alloy Phase Transformations, Séminaire OTAN, Rhodes Grèce1992 (Alloys under external forcing : steady states and microstructural evolutions[135]);

Int. Conf. on Solid-Solid Phase Transformations in Inorganic Materials '94, ASM, Pittsburgh 1994 (Driven alloys : stability and kinetics[154]);

Non-linear phenomena in materials science, Bangalor Inde, 1995 (Modeling diffusion controlled kinetics in equilibrium and driven alloys[155]);

DIMAT'96 (Diffusion in Materials), Nordkirchen Allemagne, 1996 (Modeling diffusion controlled solid state kinetics in equilibrium and driven alloys[171]);

Modeling materials for fusion reactors, Davos Suisse, 1997 (Alloys under irradiation[176]);

Materials Research Society: session Diffusion in solids, San Francisco, 1998 (From solid state diffusion to configurational kinetics[183]);

Interfaces, Prague, 1998 (Modeling non equilibrium grain boundary segregations[187]);

Grand challenges in computer modeling of materials, MIT Boston, 1998 (Modeling materials driven far form equilibrium[188]);

Solid to solid phase transformations in materials, PTM'99, Kyoto 1999 (Solid state diffusion and configurational kinetics[195]).

Main published national meetings:

La diffusion dans les milieux condensés, 19th Colloque de Métallurgie, INSTN 1977 (La diffusion dans les milieux minces[19] - Diffusion in thin media);

Fluage, fatigue-fluage, action de l'environnement, 23ème Colloque de Métallurgie, INSTN 1980 (Transformations de phases et plasticité[34] - Phase transformations and plasticity);

Formation des défauts et effets d'irradiation, Colloque annuel de la société Française de Microscopie Electronique, Besançon 1981(Apports de la microscopie électronique à l'étude des changements de phase sous irradiation[38] - Contribution of electron microscopy to the understanding of phase changes under irradiation);

Effets d'irradiation dans les matériaux, 26ème Colloque de Métallurgie, INSTN 1983 (Evolution microstructurale sous irradiation à hautes températures: aspects fondamentaux[60] - Fundamental aspects of microstructural evolution under high temperature irradiation);

Les Super Alliages, Colloque SNECMA, Evry 1993 (Modélisation de la précipitation dans les superalliages polyconstitués : de l'échelle atomique à l'échelle macroscopique[R2] - Modeling precipitation in multicomponent superalloys: from atomic scale up to macroscale);

Les Super Alliages, Colloque de synthèse du GdR, Toulouse 1995 (Cinétiques à l'état solide et mobilité atomique dans les superalliages [158] - Solid-state kinetics and atomic mobility in superalloys);

Ségrégation interfaciale dans les solides, 41ème Colloque de Métallurgie, INSTN 1998 (Les ségrégations interfaciales de non équilibre et leur modélisation[189] - Non-equilibrium interface segregations and their modeling).

Published courses [School (title $^{\text{ref}}$)]

Surfaces et interfaces en métallurgie, Ecole d'été, Gassin 1973 (Stabilité morphologique des systèmes biphasés[16] - Morphological stability of two-phases systems);

Solid-state phase transformations in metals and alloys, Ecole d'été, Aussois 1979 (The theories of unmixing kinetics of solid solutions[32]);

Diffusion in Materials, NATO workshop -E179, Aussois 1990 (Non linear effects in diffusion[99]);

Computer Simulation in Physical Metallurgy, ISPRA lectures, Italy 1984 (Basic aspects of microstructural evolution under high temperature irradiation[61]);

Materials under irradiation, Summer School, France (Cooperative processes in alloys under irradiation[128]; Radiation effects in metals and alloys[136]);

Overviews [Book (title$^{\text{ref.}}$)]

Metallurgical Science and Technology (Non equilibrium phase transitions in intermetallics[116]);

Materials Research Society Bulletin (Antisite defects and non equilibrium phase transitions in intermetallics[119]);

Solid State Physics (Driven alloys[172]);

Special issue J. Computer-Aided Materials Design (Modeling diffusion controlled kinetics in equilibrium and driven alloys[175]);

Mécanosynthèse (Transformation de phases sous broyage[179] - phase transformations under ball milling);

In *Handbook of Materials Modeling* (2005) (Kinetic Monte Carlo method to model diffusion controlled phase transformations [220]);

In *Alloy Physics* (2007) (Kinetics in non equilibrium alloys[228]).

Georges MARTIN’s peer reviewed publications

*(+Lecture or communications; *speaker)*

1 Autodiffusion au joint de grains de bicristaux d'argent soumis à une pression hydrostatique
(Grain-boundary self-diffusion in silver bicrystals under hydrostatic pressure)
G. MARTIN, D.A. BLACKBURN, Y. ADDA, Phys. Stat. Sol. **23** (1967) 223.

2 Considérations sur la relation entre le fluage sous irradiation et les dommages créés par l'irradiation en l'absence de contrainte (Relationship between irradiation creep and zero stress irradiation damage)
G. MARTIN, J.P. POIRIER, J. Nucl. Mater. 39 (1971) 93.

3 Comment on "Mass transport along grain boundary pipe lines in KBr"
G. MARTIN, Scrip. Met. **6** (1972) 437.

4 Electromigration intergranulaire de l'antimoine dans l'argent : (Grain boundary electromigration of Antimony in Silver)
G. MARTIN, Phys. Stat. Sol. **14** (1972) 183.

5 Observation d'un cristal bidimensionnel de lignes de dislocations dans le chlorure de sodium
(Observation of a two-dimensional crystal of dislocation lines in sodium chloride)
J.P. POIRIER, G. MARTIN, Phil. Mag. **27** (1973) 1455.

6 Pressure dependence of self-diffusion of Na^{22} in NaCl :
G. MARTIN, D. LAZARUS, J.L. MITCHELL, Phys. Rev. B**8** (1973) 1726.

7 Mise en évidence par effet Mössbauer de rassemblements de Cobalt dans les joints de grains du Beryllium (Mössbauer effect evidence for Cobalt clustering at grains-boundaries in Beryllium)
G. MARTIN, Phys. Stat. Sol. **a18** (1973) 683.

8+ L'électromigration intergranulaire : outil d'étude de la structure de coeur des joints de grains
(Grain-boundary electromigration as a tool to study grain-boundary core structure)
G. MARTIN*, P. TRUCHOT, Can. Met. Quartely **13** (1974) 111.

9 Atomic model for grain boundary and surface diffusion :
P. BENOIST, G. MARTIN, Thin Solid Films **25** (1975) 181.

10 Mesure des coefficients de diffusion interfaciale (Measuring interface diffusion coefficients)
G. MARTIN, Acta Met. **23** (1975) 697.

11+ Modèle atomique de diffusion intergranulaire : II Généralisation (Atomic model for grain-boundary diffusion : II general case)
P. BENOIST*, G. MARTIN, J. de Physique, Colloque **36** (1975) C4-213.

12+ La diffusion intergranulaire (Grain-boundary diffusion)
G. MARTIN*, B. PERRAILLON, J. de Physique, Colloques **36** (1975) C4-166.

13 Instabilité des solides cristallins sous irradiation (Instability of crystalline solids under irradiation)
G. MARTIN, Phil. Mag. **32** (1975) 615.

14+ Stability of void lattices under irradiation: a kinetic model
P. BENOIST*, G. MARTIN: in "Fundamental aspects of radiation damage in metals"
USERDA CONF-751006-P2 (1975) II-1236.

15+ A simple model for phase stability under irradiation :
G. MARTIN*: in "Fundamental aspects of radiation damage in metals"
USERDA CONF-751006-P2 (1975) II-1084.

16+ Stabilité morphologique des systèmes biphasés (Morphological stability of two-phases systems)
G. MARTIN*, in "Surfaces et interfaces en métallurgie", Trans. Tech. Publications (1975) 281.

17 Measurement of grain-boundary self diffusion coefficient in single phase binary solid solutions
J. BERNARDINI, G. MARTIN, Script. Met. **10** (1976) 833.

18+ Calcul de la fréquence moyenne de saut des atomes le long de joints de grains à structure périodiqu:
(Computing the mean atomic jump frequency along periodic grain-boundary structures)
V. COSTE, P. BENOIST, G. MARTIN*, in "La diffusion dans les milieux condensés",
19ème Colloque de Métallurgie, INSTN Saclay (1977) I-507.

19+ La diffusion dans les milieux minces (Diffusion in thin media)
G. MARTIN*, B. PERRAILLON : in "La diffusion dans les milieux condensés",
19ème Colloque de Métallurgie, INSTN Saclay (1977) I-367.

20 Limites de validité de l'équation de Fick (Validity limit for Fick's law)
G. MARTIN, P. BENOIST, Script. Met. **11** (1977) 503.

21 A model for morphological changes driven by step-step interaction on clean surfaces
G. MARTIN, B. PERRAILLON, Surf. Sci. **68** (1977) 57.

22 Radiation induced precipitation in NiSi solid solutions: II dose-rate effects :
A. BARBU, G. MARTIN, Scrip. Met. **11** (1977) 771.

23+ Fundamental aspects of the evolution of and phase changes in metals and alloys under irradiation
G. MARTIN*, J.L. BOCQUET, A. BARBU, Y. ADDA : in "Radiation effects in breeder reactor structural materials" Bleiberg & Bennet Editors, AIME (1977) 899.

24+ Void lattices and other radiation induced periodic structures:
G. MARTIN*, J. de Physique Colloque **38** (1977) C7-419

25 Radiation induced solute redistribution and precipitation:
G. MARTIN, Phil. Mag. A **38** (1978) 131.

26+ Radiation induced homogeneous precipitation in undersaturated solid solutions :
R. CAUVIN, G. MARTIN*, J. Nuclear Mat. **83** (1979) 67.

27+ Irradiation induced precipitation: a thermodynamical approach :
J.L. BOCQUET*, G. MARTIN, J. Nuclear Mat. **83** (1979) 186.

28 The contribution of dissipative processes to radiation induced solid solution instability :
G. MARTIN, Phys. Rev. B**21** (1980) 2122.

29+ Stabilité des alliages sous irradiation (Alloys stability under irradiation)
G. MARTIN*, R. CAUVIN, J.L. BOCQUET, A. BARBU: in "Comportement sous irradiation des matériaux métalliques et des composants des coeurs des réacteurs rapides"
Poirier et Dupouy Ed. C.E.A. (1979) 75.

30+ Measurements of grain boundary diffusion
G. MARTIN*, B. PERRAILLON, in "Grain-boundary structure and kinetics", ASM (1980) 239.

31 Low flux radiation induced precipitation
A. BARBU, A. CHAMBEROD, G. MARTIN, J. Appl. Phys. **51** (1980) 6192.

32+ The theories of unmixing kinetics of solid solutions
G. MARTIN*, in "Solid state phase transformations in metals and alloys", Editions de Physique, Orsay, France (1980) 337.

33+ Transformations de phases et plasticité (Phase transformations and plasticity)
G. MARTIN*, Ann. Chim. Fr. **6** (1981) 46.

34 On F.C.C. polycrystals under hydrostatic pressure
G. MARTIN, Script. Met. **14** (1980) 869.

35 Solid solutions under irradiation : I model for radiation induced metastability
R. CAUVIN, G. MARTIN, Phys. Rev. B **23** (1981) 3322.

36 Solid solutions under irradiation : II radiation induced precipitation in AlZn under-saturated solid solutions
R. CAUVIN, G. MARTIN, Phys. Rev. B **23** (1981) 3333.

37+ Dose-rates effects on solid solution stability
G. MARTIN*, R. CAUVIN, J.L. BOCQUET, A. BARBU : in "Phase stability during irradiation" Holland, Mansur, Potter Eds. AIME (1982) 43.

38+ Apports de la microscopie électronique à l'étude des changements de phase sous irradiation
(Contribution of electron microscopy to the understanding of phase changes under irradiation)
G. MARTIN*, R. CAUVIN, A. BARBU, J. Microsc. Electronique **6** (1981) 383.

39+ Effects of irradiation on phase stability and phase changes
G. MARTIN*, R. CAUVIN, A. BARBU : in "Solid-solid phase transformations", Aaronson et al. Eds. AIME (1982) 257.

40+ Radiation induced solid solution instability
R. CAUVIN*, G. MARTIN, Référence 39, p. 281.

41+ Radiation induced destabilization of Al base solid solutions
R. CAUVIN*, G. MARTIN, Référence 39, p. 287.

42+ Precipitate coarsening in alloys under irradiation
K. URBAN*, G. MARTIN, Référence 39, p. 317.

43 Solid solutions under irradiations : III further comments :
R. CAUVIN, G. MARTIN, Phys. Rev. B**25** (1982) 3385.

44 Precipitate coarsening induced by point defect recombination in alloys under irradiation :
K. URBAN, G. MARTIN, Acta Met. **30** (1982) 1209.

45+ A reaction-diffusion model of solid solutions under irradiation :
R. CAUVIN, G. MARTIN* : Proc. Yamada Conf. V, Point Defects and Defects Interactions in Metals, Takamura et al. Eds., U. of Tokyo Press (1982) 931.

46+ Free energy calculation of small clusters
G. MARTIN*, A. PERINI, G. JACUCCI, Ref. 45, p. 718.

47 Modèle simple d'évolution de la microstructure des solides sous irradiation (Simple model for microstructural evolution under irradiation)
P. VALENTIN, G. MARTIN, Phil. Mag. A **46** (1982) 971.

48+ Irradiation induced solid solutions instability
G. MARTIN*, R. CAUVIN, J.L. BOCQUET, A. BARBU, Ref. 45, p. 923.

49 Monte-Carlo computation of clusters free energies in the Ising model: a test for the validity of the capillarity approximation
G. JACUCCI, A. PERINI, G. MARTIN, J. Phys. A : Math. Gen. **16** (1983) 369.

50+ Cooperative effects in microstructural evolutions under irradiation: fundamental aspects
P. VALENTIN*, G. MARTIN: in "Effects of radiation on materials"
ASTM STP782, Brager, Perrin Eds., ASTM (1982) 1103.

51+ Synergistic effects during high temperature irradiation
P. VALENTIN, G. MARTIN*: in "Dimensional stability under irradiation", BNES 2 (1983) 17.

52 Les changements de phase sous irradiation (Phase changes under irradiation)
G. MARTIN, R. CAUVIN, J.L. BOCQUET, A. BARBU
Echos du C.E.A., Science et Recherche (1982) 59.

53 Solid solution stability under irradiation
G. MARTIN, R. CAUVIN, A. BARBU, in "Phase transformation during irradiation",
F. Nolfi Ed., Appl. Sci. London (1983) 42.

54 Long range periodic decomposition of irradiated solid solutions
G. MARTIN, Phys. Rev. Letters **50** (1983) 250.

55+ Implantation, ion beam mixing and solid state solubility
G. MARTIN*, A. BARBU, J. Nucl. Inst. Meth. **209-210** (1983) 203.

56 Phase stability under irradiation : Ballistic effects
G. MARTIN, Phys. Rev. **B30** (1984) 1424.

57 Clusters free energy in the simple cubic Ising Model
A. PERINI, G. JACUCCI, G. MARTIN, Phys. Rev. **B29** (1984) 2689.

58+ Interfacial contribution to clusters free energy
A. PERINI, G. JACUCCI, G. MARTIN*, Surf. Sci. **144** (1984) 53.

59+ Phase stability under irradiation
G. MARTIN*, A. BARBU, Acta-Scripta Met. Proc. Series 2 , "Early stages of decomposition" Pr. Haasen Ed. 1984 (Pergamon, Paris) 70.

60+ Evolution microstructurale sous irradiation à hautes températures : aspects fondamentaux (Fundamental aspects of microstructural evolution under high temperature irradiation)
G. MARTIN*, P. VALENTIN, Ann. Chim. Fr. **9** (1984) 193.

61+ Basic aspects of microstructural evolution under high temperature irradiation
G. MARTIN*, P. VALENTIN
in "Computer Simulation in Physical Metallurgy" G. Jacucci Editor, 1986, ECSC, EEC, Brussels, p. 183.

62 Biais des dislocations dans les alliages dilués (Dislocations bias in dilute alloys)

P. VALENTIN, G. MARTIN, Phil. Mag. **51** (1985) 715.

63 Premières évaluations des dégâts d'irradiation par ions lourds de très haute énergie à GANIL
(First observations of radiation damage by heavy ions with very high energy at GANIL)
A. BARBU, G. MARTIN, M. TOULEMONDE, J.C. JOUSSET
C.R.A.S. 299, Série II, n°**8** (1984) 409.

64 Cavitation en volume dans des solutions binaires à base de Nickel fatiguées à haute température
(Bulk cavitation in Ni base alloys under high temperature cyclic loading)
B. ARNAUD, R. Le HAZIF, G. MARTIN, Acta Met. **33** (1985) 1105.

65+ Evolution structurale et cavitation en volume dans un alliage NiGe 6 at% fatigué à 0.5 Tf
(Microstructural évolution and bulk cavitation in a NiGe 6 at% Alloy under cyclic loading at .5 Tm)
B. ARNAUD, R. Le HAZIF*, G. MARTIN, ICSMA 7, Montréal 1985.

66+ Stability criteria for phases under irradiation
G. MARTIN*, P. BELLON : in "Solute-defect interaction **-** Theory and experiments"
Edited by S. Saimoto, G.R. Purdy, G.V. Kidson, Pergamon, Toronto, (1986) 282 (P5942).

67+ Alloys evolution under irradiation
G. MARTIN*, P. BELLON, Rad. Effects **101** (1987) 109.

68+ Saturation of irradiation induced precipitation
G. MARTIN*, in : "Atomic transport and defects in metals by neutron scattering"
Springer Proceedings in Physics **10** (Springer Berlin) (1986) 225 (P6014)
C. Janot, W. Petry, D. Richter, T. Springer.

69+ Point defect dynamics in non homogenous alloys under irradiation :
C. ABROMEIT*, G. MARTIN
Rad. Induced Changes in Microstructure, 13è Int. Symp. Part I, F.A. Garner,
N.H. Packan, A.S. Kunar Eds. ASTM-STP 955 (1987) 822 (T4010-13 Vol. 1).

70 A simple model for the crystal to amorphous phase transition under Laser annealing
E. GAFFET, G. MARTIN, J. Mat. Sci. Eng. **82** (1986) L13.

71 Determination of the activation energies for nucleation and growth of crystal nuclei in metallic glasses
S. C. Wu, M. HAMELIN, J. BIGOT and G. MARTIN, J. Mat. Sci. **21** (1986) 3581-3589.

72 Amorphization of a Metalloid rich ferritic steel by continuous CO2 laser : a microstructural investigation
E. GAFFET, G. DELUZE, G. MARTIN, J.M. PELLETIER and D. PERGUE
Mat. Sci. Eng. **98** (1988) 291-294.

73+ Microstructure of rapidly quenched (Al, Mn) alloys
K. YU ZHANG*, J. BIGOT, G. MARTIN, R. PORTIER, D. GRATIAS
Proc. XIth Int. Cong. on Electron Microscopy, Kyoto (1986) 167.

74+ Irradiation induced formation of metastable phases: a theoretical approach
P. BELLON*, G. MARTIN, Nucl. Inst. Meth. Phys. Res. B**19/20** (1987) 619.

75+ Theoretical approaches to phase stability criteria under irradiation
G. MARTIN*, P. BELLON, Materials Science Forum 15-18 (1987) 1337.

76+ Stability criteria for phases under irradiation
G. MARTIN*, P. BELLON
"Pattern, defects and microstructures in non equilibrium systems" Edited by D. Walgraef
NATO ASI, Series E : Appl. Sci. n° **121** (1987) 351.

77+ Amorphization by solid state diffusion in granular system
E. GAFFET*, J. BIGOT, G. MARTIN
in "Phase Transformations'87" G.W. Lorimer Ed., the Inst. of Metals : Cambridge (1987) p. 604.

78+ Mécanisme d'amorphisation par faisceau Laser d'un acier riche en métalloïdes (Laser amorphisation mechanism of a metalloid rich steel)
E. GAFFET* G. DELUZE, G. MARTIN, J. M. PELLETIER, Ann. Chim. Fr. **13** (1988) 241-246.

79 Dodecahedral shaped quasicrystalline precipitates in dilute AlMn solid solutions :
K. YU ZHANG, J. BIGOT, J.P. CHEVALIER, D. GRATIAS, G. MARTIN, R. PORTIER
Phil. Mag. B **58** (1988) 1-13.

80+ Metastable phases formation under irradiation
G. MARTIN*, P. BELLON, (Los Alamos 1987) J. Less Common Metals **140** (1988) 211.

81 Modèle d'évolution morphologique des superalliages hors contrainte : Influence de l'aire d'interface γ/γ' (A model for the morphological evolution in superalloys under zero stress: role of the γ/γ' interfacial area)
M. CORNET, G. MARTIN, Scripta Met. **21** (1987) 1091.

82 Incubation time and frequency of pitting of passive layers
G. MARTIN, B. BAROUX, Europhysics Letters **5** (1988) 629.

83 Amorphization by solid-state diffusion in granular systems
E. GAFFET, J.C. ANGLEZIO, J. BIGOT, G. MARTIN, J. Less Comm. Metals **140** (1988) 49.

84+ An electron microscopy study of the formation of amorphous alloys by mechanical alloying in the NiZr system
E. GAFFET*, N. MERK, G. MARTIN, J. BIGOT
in "New Materials by Mechanical Alloying Techniques" E. Artz et L. Schultz eds. Information Verlag Gesellschaft (1989) p. 95.

85+ Fluctuations around equilibrium and steady-states in solids under dynamical solicitations
P. BELLON*, G. MARTIN
in "Non Linear Phenomena in Materials Science", L. Kubin, G. Martin Eds.
(Trans. Tech., Suisse 1988) p. 109.

86 Irradiation induced formation of metastable phases: a master equation approach
P. BELLON, G. MARTIN, Phys. Rev. B **38** (1988) 2570.

87 Influence of substrate induced misfit stresses on Miscibility Gap in Epitaxial Layers Application to III - V Alloys
F.C. LARCHE, W.C. JOHNSON, C.S. CHIANG, G. MARTIN, J. Appl. Phys. **64** (1988) 5251.

88+ Coherency stress effects on the growth kinetics of thin films
W.C. JOHNSON, G. MARTIN*
in "Non Linear Phenomena in Materials Science", L. Kubin, G. Martin Eds.
(Trans. Tech., Suisse 1988) p. 247.

89+ Adiabatic approximation for irradiation induced instabilities in concentrated alloys

C. ABROMEIT*, G. MARTIN
in "Non Linear Phenomena in Materials Science", L. Kubin, G. Martin Eds.
(Trans. Tech., Suisse 1988) p. 321.

90 Cascade effects in a non-equilibrium phase transition with metallurgical relevance
P. BELLON, G. MARTIN, Phys. Rev. B **39** (1989) 2403.

91+ Bulk and surface defects in implanted and annealed GaAs
P. BELLON*, J.P. CHEVALIER, G. MARTIN, P. DECONINCK, J. MALUENDA
in "Microscopy of semiconducting materials 1987", A.G. Cullis, P.D. Augustus Eds.,
Inst. Phys. Conf. Ser. 87, (Bristol, UK, 1987) 309.

92+ Cascade effect on respective stability of ordered phases in Ni4Mo under irradiation
P. BELLON*, G. MARTIN, J. of the Less Com. Metals **145** (1988) 465-475.

93 Quantitative description of mixing with light ions
A. TRAVERSE, M.G. LE BOITE, G. MARTIN, Europhys. Lett. **8** (1989) 633-637.

94+ Ball milling amorphization mechanism of NiZr alloys
E. GAFFET*, N. MERK, G. MARTIN, J. BIGOT
J. of the Less Comm. Metals : **145** (1988) 251-260.

95 Chemical ordering in GaxIn1-xP semiconductor alloys grown by metallorganic vapor phase epitaxy
P. BELLON, J.P. CHEVALIER, G. MARTIN, E. DUPONT NIVET, C. THIEBAUT,
J.P. ANDRE, Appl. Phys. Letters **52** (1988) 567.

96 Substrate driven ordering microstructure in GaxIn1-xP alloys :
P. BELLON, J.P. CHEVALIER, E. AUGARDE, J.P. ANDRE, G.P. MARTIN
J. Appl. Phys. **66** (1989) 2388.

97 Chemical disorder induced amorphization in NiZr2 : a constant temperature - constant pressure molecular dynamics study combined with the tight binding approach
C. MASSOBRIO, V. PONTIKIS, G. MARTIN, Phys.Rev.Letters **62** (1989) 1142.

98+ Stochastic description of cascade size effects on phase stability under irradiation
G. MARTIN*, P. BELLON
Mat. Res. Soc. Symp. Proc. 88 Symposium Q, Boston, **138** (1989) 15.

99+ Defects in recrystallized Se+ implanted GaAs : influence of electrical activity
P. BELLON*, J.P. CHEVALIER, L. AISSAOUI, J. MALUENDA, G. MARTIN
Inst. of Phys. Conf. Series "Microscopy of semiconducting Materials" **100** (1989) 415.

100+ Ordering in GaInP alloys on GaAs : effects of substrate orientation
E. AUGARDE, M. MPASKOUTAS, P. BELLON*, J.P. CHEVALIER, G. MARTIN
Inst. of Phys. Conf. Series "Microscopy of semiconducting Materials" **100** (1989) 155.

101+ Non linear effects in diffusion
G. MARTIN*
"Diffusion in Materials": A.L. Laskar, J.L. Bocquet, G. Brébec, C. Monty Eds, NATO ASI,
E179, 1990, 129.

102 A calorimetric study of mechanically induced phase transformations in Ni Zr alloys :
N. MERK, E. GAFFET, G. MARTIN, J. Less Common Metals, **153** (1989) 299.

103+ Etude microstructurale de l'amorphisation superficielle d'un alliage base fer, irradié par laser CO_2 continu :
E. GAFFET, G. DELUZE, G. MARTIN, J.M. PELLETIER*
J. de Physique Coll.7, supp.12, **48** (1987) 131.

104 The atomic mobility in Cahn's diffusion Model
G. MARTIN, Phys. Rev., **B41** (1990) 2279.

105 Influence of elastic stress on the growth kinetics of planar thin film binary diffusion couples
W.C. JOHNSON, G. MARTIN, J. Appl. Phys. **68** (1990) 1252-1264.

106+ Stochastic description of compound stability under irradiation : temperature flux and cascade size effects
F. HAIDER, P. BELLON, N.V. DOAN*, G. MARTIN
ICFRM-4, Kyoto, Japan, 4-8 Décembre 1989, J. of Nuclear Materials, **179-181**, part. A et B (1991) 793.

107+ Disorder induced amorphization of intermetallic compounds : a molecular dynamics study
C. MASSOBRIO, V. PONTIKIS, N.V. DOAN*, G. MARTIN
ICFRM-4, Kyoto, Japan, 4-8 Décembre 1989, J. of Nuclear Materials, **179-181**, part.A et B (1991).

108+ Mechanical alloying : far from equilibrium phase transitions ?
G. MARTIN* and E. GAFFET
J. de Phys., Colloque C4, Suppl. au N° 14, **51** (1990) 71-77
Int. Symp. on Amorphization by Solid-State Reaction, Grenoble, Févr. 1990.

109+ A study of phase stability in INVAR FeNi alloys by anomalous X-Ray scattering
J.P. SIMON, O. LYON, F. FAUDOT, J. RZEPSKI, O. DIMITROV*, L. BOULANGER, G. MARTIN
in "Physical Metallurgy of controlled expansion Invar type alloys", K.C. Russell and D.F. Smith Editors, The Minerals, Metals and Materials Society, 1990, p. 51.

110+ The contribution of electronic energy losses to radiation damage in metallic materials
A. AUDOUARD, E. BALANZAT, A. BARBU, J. DEVAUD-RZEPSKI, C. DIMITROV, A. DUNLOP*, J. DURAL, G. FUCHS, J.C. JOUSSET, D.LESUEUR, N. LORENZELLI, G. MARTIN, L. THOME, A.M. WACHE
Rad. Effects and Defects in Solids, **110** (1989) 113.

111+ Theoretical approaches of structural modifications induced by ion irradiation
G. MARTIN*, P. BELLON, Rad. Effects and Defects in Solids, **110** (1989) 77.

112+ Ball milling amorphization in a vibrating frame grinder
Y. CHEN, R. LE HAZIF, G. MARTIN*
J. de Phys., Colloque C4, Suppl. au N° 14 , **51** (1990) 273-279.
Int. Symp. on Amorphization by Solid-State Reaction, Grenoble, Févr. 1990

113 Non equilibrium transitions in driven AB_3 compounds with FCC lattice: a multivariate master equation approach
F. HAIDER, P. BELLON, G. MARTIN, Phys. Rev. **B 42** (1990) 8274.

114 Cascade size effects on phase stability under irradiation: a stochastic description
P. BELLON, G. MARTIN, Radiation Effects and Defects in Solids, **113** (1990) 165.

115 Molecular dynamics study of amorphization by introduction of chemical disorder in crystalline $NiZr_2$
C. MASSOBRIO, V. PONTIKIS, G. MARTIN, Phys. Rev. **B41** (1990-II) 10486.

116 Non equilibrium phase transitions in intermetallics
G. MARTIN, P. BELLON, Metallurgical Science and Technology **9** (1991) 61-74.

117+ Cascade size effects in phase transformations under irradiation
P. BELLON*, G. MARTIN, Ann. Soc. Fr. Chim. Min. **16** (1991) 365-371.

118+ Amorphization in a vibrating frame grinder : an example of phase transition in driven systems
Y. CHEN*, R. LE HAZIF, G. MARTIN, Mat. Sci. Forum **88-90** (1992) 35.

119 Antisite defects and non-equilibrium phase transitions in intermetallics
G. MARTIN, P. BELLON, MRS Bulletin, **16** (1991) 33.

120+ Interface stability in driven compounds
F. SOISSON*, P. BELLON, G. MARTIN
"Ordering and Disordering in alloys", Yavari ed., Elsevier (Londres) 1992, p. 207.

121 Dynamical lattice model for binary alloys under radiation : mean field solutions and Monte Carlo simulations
E. SALOMONS, P. BELLON, F. SOISSON, G. MARTIN, Phys. Rev. **B 45** (1992) 4582.

122+ Stochastic description of ordering in driven compounds
P. BELLON*, G. MARTIN
"Ordering and Disordering in alloys", Yavari ed., Elsevier (Londres) 1992, p. 172.

123 Driving force and mobility for microstructural evolutions: the rate of grains rotation across a grain boundary
G. MARTIN, Phys. Stat. Sol.**b172** (1992) 121.

124 Stability of driven compounds : stochastic and deterministic descriptions
P. BELLON, F. SOISSON, G. MARTIN, F. HAIDER
"Non linear Phenomena in Materials Science" II, G. Martin and L. Kubin eds, (Trans. Tech. Publ. Suisse 1992) p. 169.

125 Influence of milling conditions on the formation of metastable phases : the crystal to amorphous transition
Y. CHEN, R. LE HAZIF, G. MARTIN
"Non linear Phenomena in Materials Science" II, G. Martin and L. Kubin eds, (Trans. Tech. Publ. Suisse 1992) p. 271.

126+ Influence of the cascade size on the amorphization of phosphide in Ni base filler metals
L. BOULANGER*, P. BELLON, Y. SERRUYS, N.V. DOAN, G. MARTIN
J. Nucl. Mater. **191-194** (1992) 473- 477.

127+ Sintering of crystalline solids: a new modelization technique
A. PAVLOVITCH*, G. MARTIN
1st Tohwa Utr Int. Symp. on Slow dynamics in condensed matter; Fukuoka, Nov. 1991.

128+ Cooperative Processes in Alloys under Irradiation
P. BELLON*, G. MARTIN, Solid State Phenomena **30-31** (1993) 107.

129 On the interface transfer coefficient in second phase growth models

P. MAUGIS, G. MARTIN, Phys. Rev. **B49,** 11580 (1994).

130+ On the interface transfer coefficient in second phase growth models
P. MAUGIS, G. MARTIN*, Mater. Sci. Forum, **155-156** (1994).

131+ Phase stability and kinetic pathes in ordered alloys under irradiation
P. BELLON*, F. SOISSON, G. MARTIN, F. HAIDER
Defect and Diffusion Forum **95-98** (1993) 85-90.

132 Two-phase dynamical equilibria driven by irradiation in ordered alloys
F. SOISSON, P. BELLON, G. MARTIN, Phys. Rev.**B46** (1992) 11332.

133+ Phase stability and microstructural evolutions in concentrated alloys under irradiation
G. MARTIN*, F. SOISSON, P. BELLON, J. Nucl. Mater. **205** (1993) 301-311.

134+ Modélisation numérique en Science des Matériaux de l'échelle atomique à l'échelle
mésoscopique (Materials computer modeling form the atomic- up to the meso-scale)
G. MARTIN, A. PAVLOVITCH*, Mem. Sci. Rev. Met. **89** (1992) 555.

135+ Alloys under external forcing : steady states and microstructural evolutions
G. MARTIN*, P. BELLON
in "Statics and Dynamics of Alloy Phase Transformations", P.E.A. Turchi and A. Gonis editors,
Plenum Press, New York, 1994, PP. 605-633.

136+ Radiation effects in metals and alloys
A. BARBU, G. MARTIN*, Solid State Phenomena **30-31** (1993) 179-228.

137 Ball milling induced amorphization in Ni_xZr_y : a parametric study.
Y. CHEN, M. BIBOLE, R. LE HAZIF, G. MARTIN, Phys. Rev. **B48** (1993) 14.

138+ Order disorder transition in driven compounds
P. BELLON*, F. SOISSON, G. MARTIN, TMS Chicago, 1993.

139+ Phase equilibria under irradiation
P. BELLON*, F. SOISSON, Y. GRANDJEAN, G. MARTIN
MRS Spring meeting 1993.

140+ Steady-states and microstructural evolutions in driven systems
P. BELLON*, F. SOISSON, G. MARTIN
J. de Physique IV, Colloque C7, supp. J. de Phys. **3** (1993) 1977.

141+ Amorphization of Ni_xZr_y Alloys by High Energy Ball Milling
Y. CHEN, R. LE HAZIF, M. BIBOLE, L. CHAFFRON*, G. MARTIN
Proc. of 1993 Powder Metallurgy World Congress, JSPPM eds (1993) 312.

142+ Synthesis of Alloys with Dispersoids by Ball Milling
L. CHAFFRON*, G. MARTIN, F. POZARNIK
Proc. of 1993 Powder Metallurgy World Congress, JSPPM eds (1993) 452.

143+ Interphase and antiphase boundary stability in bcc compounds under irradiation
F. SOISSON*, P. BELLON, G. MARTIN, E. SALOMONS, J. Nucl. Mater. **205** (1993) 324-331.

144 On the relaxation rate of conserved and non conserved order parameters in systems with metallurgical relevance
G. MARTIN, Phys. Rev. **B50** (1994) 12362.

145+ Modélisation de composés ordonnés sous irradiation : diagrammes d'équilibre dynamique et évolutions microstructurales
F. SOISSON*, P. BELLON, G. MARTIN
J. de Physique IV, Colloque C3, Suppl. au J. de Phys. III, **4** (1994) C-183.

146+ Monte Carlo simulations of precipitation of $L1_2$ ordered phase
T.A. ABINANDANAN, F. HAIDER, G. MARTIN*
"Solid-Solid Phase Transformations '94", W.C. Johnson, J.M. Howie, D.E. Laughlin and W.A. Soffa, eds, TMS (1994) 443.

147+ Shift from second- to first order of the A2-B2 transition in an Fe-Al alloy under 1MeV electron irradiation
F. SOISSON*, P. DUBUISSON, P. BELLON, G. MARTIN
"Solid-Solid Phase Transformations '94", W.C. Johnson, J.M. Howie, D.E. Laughlin and W.A. Soffa eds, TMS (1994) 981.

148+ The kinetics of coherent precipitation of ordered phases
G. MARTIN*, F. SOISSON
"Solid-Solid Phase Transformations '94", W.C. Johnson, J.M. Howie, D.E. Laughlin and W.A. Soffa, eds, TMS (1994) 497.

149 Cinétique de précipitation cohérente de phases ordonnées (Precipitation kinetics of ordered compounds)
G. MARTIN*, F. SOISSON, J. de Phys. IV; Colloque C3, suppl^{nt}, **5** (1995) C3-317.

150+ Modeling of ordered precipitates under irradiation : dissolution regimes and interfacial width
M. PRZYBYLOWICZ, P. BELLON*, G. MARTIN
"Solid-Solid Phase Transformations '94", W.C. Johnson, J.M. Howie, D.E. Laughlin and W.A. Soffa, eds, TMS (1994) 999.

151+ Phase evolution under irradiation ; Monte-Carlo and mean field modeling
P. BELLON*, Y. GRANDJEAN, M. PRZYBYLOWICZ, F. SOISSON, G. MARTIN
Nucl. Instr. and Methods in Phys. Res. **B102** (1995) 72.

152 Kinetics of the ball-milling induced order-disorder transformation in Fe-Al
P. POCHET, L. CHAFFRON, G. MARTIN, Materials Science Forum **179-181** (1995) 91-96.

153 Kinetic model for equilibrium and nonequilibrium segregation in concentrated alloys under irradiation
Y. GRANDJEAN, P. BELLON, G. MARTIN, Phys. Rev., **B 50** (1994) 4228.

154+ Driven alloys : stability and kinetics
G. MARTIN*, P. BELLON and F. SOISSON
"Solid-Solid Phase Transformations '94", W.C. Johnson, J.M. Howie, D.E. Laughlin and W.A. Soffa, eds, TMS (1994) 937.

155+ Modelling Diffusion controlled kinetics in equilibrium and driven alloys
G. MARTIN*, P. BELLON, F. SOISSON
"Non Linear Phenomena in Materials Science III", G. Ananthakrishna, L.P. Kubin et G. Martin eds, Solid State Phenomena **42-43** (1995) 97.

156 Order-disorder transformation in Fe-Al under ball milling
P. POCHET, E. TOMINEZ, L. CHAFFRON, G. MARTIN, Phys. Rev., **B52** (1995) 4006-4016.

157 Effects of the Interaction between Order Parameter and Concentration on the Kinetics of Alloy Ordering
V.YU. DOBRETSOV, G. MARTIN, F. SOISSON, V.G. VAKS
Europhysics Letters, **31** (1995) 417-422.

158+ Cinétiques à l'état solide et mobilité atomique dans les superalliages
(Solid-state kinetics and atomic mobility in superalloys)
O. DIMITROV* and G. MARTIN*, Colloque Superalliages, CNRS Toulouse, 1995.

159+ Phase transformations involving ordering and phase separation : a Monte-Carlo study
T.A. ABINANDANAN*, F. HAIDER, G. MARTIN
"Non Linear Phenomena in Materials Science III", G. Ananthakrishna, L.P. Kubin and G. Martin eds, Solid State Phenomena **42-43** (1995) 87.

160 Monte Carlo Simulations of Copper Precipitation in Dilute iron-copper Alloys during Thermal Ageing and under Electron Irradiation
F. SOISSON, A. BARBU, G. MARTIN, Acta Metal. and Mater. **44** (1996) 3789.

161 Diffusion in crystals with non-conservative defects
G. MARTIN, C. DESGRANGES, Europhysics. Lett. **44** (1998) 150-155.

162 Amorphization mechanism of $NiZr_2$ by ball-milling
D. GALY, L. CHAFFRON, G. MARTIN, J. of Materials Research, **12** (1997) 688.

163 Order-disorder transition under shearing : application to ball milling
P. POCHET, P. BELLON, L. CHAFFRON, G. MARTIN, MRS Symposium, **400** (1996) p. 13.

164 A Monte Carlo study of B2 ordering and precipitation via vacancy mechanism in BCC lattice
M. ATHENES, P. BELLON, G. MARTIN, F. HAIDER, Acta Mater., **44** (1996) 4739.

165 Kinetic features of phase separation under alloy ordering
V.YU. DOBRETSOV, V.G. VAKS, G. MARTIN, Phys. Rev., **B54** (1996-I) 3227.

166 Driven Alloys
G. MARTIN and P. BELLON, Solid State Physics **50** (1996) 189.

167 Atomistic Modeling of Kinetics in Intermetallics
P. BELLON*, Y. GRANDJEAN, G. MARTIN, R. AVERBACK
J. de Physique IV, Col., **6** (1996) C2-11.

168 Monte Carlo Simulation of Simultaneous Ordering and Precipitation in BCC Lattice
M. ATHENES, P. BELLON*, G. MARTIN, F. HAIDER
J. de Physique IV, Col., **6** (1996) C2-53.

169 Monte Carlo Simulation for BCC Alloys under Irradiation : Phase Stability and Microstructural Evolutions
F. SOISSON*, P. BELLON, A. BARBU, G. MARTIN
Mat. Res. Soc. Symp. Proc. **373** (1995) 89.

170 Identification of novel diffusion cycles in B2 ordered phases by Monte Carlo simulation
M. ATHENES, P. BELLON, G. MARTIN, Phil. Mag. **A 76** (1997) 565.

171+ Modelling diffusion controlled solid state kinetics in equilibrium and driven alloys
G. MARTIN*, P. BELLON, F. SOISSON, Defect and Diffusion Forum **143-147** (1997) 385.

172+ Interdiffusion in concentrated quartenary Ag-In-Cd-Sn alloys : modelling and measurements
C. DESGRANGES*, F. DEFOORT, S. POISSONNET, G. MARTIN
Defect and Diffusion Forum **143-147** (1997) 603.

173+ Identification of new diffusion mechanisms in B2 ordered phase by Monte Carlo simulation.
M. ATHENES, P. BELLON, G. MARTIN*
Defect and Diffusion Forum **143-147** (1997) 297.

174+ Phase transformation under ball milling : theory versus experiment.
P. POCHET*, P. BELLON, L. CHAFFRON, G. MARTIN
Mater. Sci. Forum, **225-227** (1996) 207.

175+ Modelling Diffusion controlled kinetics in equilibrium and driven alloys.
G. MARTIN*, P. BELLON, F. SOISSON
J. Computer-Aided Materials Design, **3** (1996) 187-209.

176+ Alloys under irradiation.
G. MARTIN*, P. BELLON, F. SOISSON, J. Nucl. Mater. **251** (1997) 86-88.

177+ Microstructural kinetics in alloys undergoing transmutations : application to AIC neutron absorbers.
C. DESGRANGES, G. MARTIN*, F. DEFOORT; Mat. Res. Soc. Symp. Proc. **439** (1997) 401.

178+ Non-equilibrium microstructures in alloys under shearing : application to ball milling
P. POCHET, G. MARTIN, P. BELLON*
Proc. Int. Conf. Recent . Adv. in Metal. Processes 97, Bangalor 16-19 July 1997.

179 Transformations de phases sous broyage (phase transformations under ball milling)
P. POCHET, L. CHAFFRON, P. BELLON, G. MARTIN, Ann. Chim. Sci. Mat. **22** (1997) 363.

180+ DIMAT 96 : Concluding remarks
G. MARTIN*, Defect and Diffusion Forum **143-147** (1997)1709.

181 Phase transformations under ball milling
P. POCHET*, P. BELLON, L. BOULANGER, L. CHAFFRON, G. MARTIN
Materials Science Forum **269-272** (1998) 655.

182+ Dynamical phase changes induced by point defect fluxes under irradiation
C. ABROMEIT*, G. MARTIN, J. Nucl. Mater, **271 &272** (1999) 251-255.

183+ Fom solid state diffusion to configurational kinetics
G. MARTIN*, M. ATHèNES, C. DESGRANGES, M. NASTAR, F. SOISSON
Mat. Res. Soc. Symp. Proc. **527** (1998) 35-47.

184+ Role of interstitials and interstitial-impurity interaction on irradiation induced segregation in austenitic steels
M. NASTAR*, P. BELLON, G. MARTIN, J. RUSTE
Mat. Res. Soc. Symp. Proc. **481** (1997) 383.

185 Selfconsistent formulation of configurational kinetics close to equilibrium : the phenomenological coefficients for diffusion in crystalline solids.
M. NASTAR, V. YU DOBRETSOV, G. MARTIN, Phil. Mag. **A80** (2000) 155-184.

186 Computer simulation of diffusional phase transformations: Monte Carlo algorithm and application to precipitation of ordered phases.
T.A. ABINANDANAN, F. HAIDER, G. MARTIN, Acta Mater. **46** (1998) 4243-4255.

187+ Modelling non-equilibrium grain boundary segregations
M. NASTAR and G. MARTIN*, Materials Science Forum **294-296** (1999) 83-90.

188 Modelling materials driven far from equilibrium
G. MARTIN, Current Opinion in Solid State & Materials Science **3** (1998) 552-557.

189+ Les ségrégations interfaciales de non-équilibre et leur modélisation (Non-equilibrium interfacial segregations and their modeling)
G. MARTIN* and M. NASTAR, J. Phys. IV France **9** (1999) Pr 4-59.

190 Dislocation pinning by small interstitial loops : a molecular dynamics study
D. RODNEY, G. MARTIN, Phys. Rev. Lett. **82** (1999) 3272.

191 Ordering and phase separation in Ni-Cr-Al: Monte Carlo simulation vs three dimensional atom probe
C. PAREIGE, F. SOISSON, G. MARTIN, D. BLAVETTE, Acta mater **47** (1999) 1889-1899.

192 Rôle de l'interstitiel et de l'interaction interstitiel-impureté sur la ségrégation induite par l'irradiation dans les aciers austénitiques (role of interstitials and solute-interstitial interaction on irradiation induced segfregations in austenitic steels)
M. NASTAR*, P. BELLON, G. MARTIN, J. Phys. IV France **9** (1999) Pr 4-69.

193+ Kinetics of decomposition of metastable solid solutions : comparison between Monte Carlo simulations and classical theories
F. SOISSON*, G. MARTIN
Jap. Inst. Of Metals Proc. **12** (JIMIC-3), 1999, 757, M. Koiwa, K. Otsuka and T. Miyazaki eds.

194+ Ordering and phase separation in model superalloys : 3D Atom Probe versus Monte Carlo simulation
D. BLAVETTE*, F. SOISSON, G. MARTIN, C. PAREIGE
Jap. Inst. Of Metals Proc. **12** (JIMIC-3), 1999, 63, M. Koiwa, K. Otsuka and T. Miyazaki eds.

195+ Solid state diffusion and configurational kinetics
M. ATHENES, F. SOISSON, P. BELLON, G. MARTIN*
Jap. Inst. Of Metals Proc. **12** (JIMIC-3), 1999, 433, M. Koiwa, K. Otsuka and T. Miyazaki eds.

196 Reactive solid state dewetting
L. SCHMIERGELD-MIGNOT, P.J.A. MOLINÀS-MATA, S. POISSONNET, G. MARTIN
Phil. Mag. Letters, **80** (2000) 33-40.

197 Effects of atomic mobilities on phase separation kinetics : a Monte Carlo study
M. ATHÉNES, P. BELLON, G. MARTIN, Acta mater. 48 (2000) 2675.

198 Phase transformations under ball milling
L. CHAFFRON, P. POCHET, P. BELLON, G. MARTIN
International Journal of Non Equilibrium Prcocessing, **11** (2002) 347-361.

199 Dislocation pinning by glissile interstitial loops in a nickel crystal : a molecular-dynamics study
D. RODNEY, G. MARTIN, Phys. Rev. **B 61** (2000) 8714.

200 Les matériaux du nucléaire et l’irradiation (nuclear materials and irradiation effects)
G. MARTIN, D. LESUEUR
« Les matériaux du nucléaire», rapport édité par A. Zaoui et col., pour l’Académie des Sciences, rst n°5 (éditions TEC & DOC Paris, 2000), Chapter 1.

201 Monte Carlo simulations of the decomposition of metastable solid solutions : transient and steady-state nucleation kinetics
F. SOISSON, G. MARTIN, Phys. Rev.**B 62** (2000-I) 203-214.

202 Kinetics and mechanisms of reactive solid state dewetting in the system Ag-Ni-O
H. de MONESTROL, L. SCHMIRGELD-MIGNOT, Patrici MOLINÀS-MATA, S. POISSONNET, G. MARTIN, Acta mater, **49** (2001) 1655-1660.

203 Relationship between the electronic structure and the precipitaion of FeTiP in interstitial-free ferritic steels
R.P. GUPTA, G. MARTIN, S. LANTERI, P. MAUGIS and M. GUTTMANN
Phil. Mag. **A 80** (2000) 2393-2403.

204+ Le vieillissement des matériaux sous irradiation (Materials aging under irradiation)
G. MARTIN*, F. SOISSON, J. de Physique IV **11** (2001) Pr1-177.

205+ Near surface transformations : an example of driven phase transformations
L.CHAFFRON, G.MARTIN*
Tribology Research: from Model Experiment to Industrial Problems, G. Dalmaz et al. Editors, in Tribology series, (Elsevier Science B) **39** (2001) 429-438.

206 Reactive solid state dewetting of Ag films on Ni substrates : kinetics and mechanisms
H. de MONESTROL, L. SCHMIRGELD-MIGNOT, Patrici MOLINÀS-MATA, S. POISSONNET, L. GAY, G. MARTIN, Defect and Diffusion Forum **194-199** (2001) 1349-1354.

207 Driven phase transformations : a useful concept for wear studies ?
L.CHAFFRON, Y. LE BOUAR, G.MARTIN
C. R. Acad. Sci. Paris, t. 2, Série IV (2001) 749-759.

208+ Interstitial cluster motion in nickel : a Molecular Dynamics study
N. V. DOAN, D. RODNEY*, G. MARTIN, Defect and Diffusion Forum, **194-199** (2001) 43-48.

209+ Effect of dislocation pinning by glissile interstitial loops on the plasticity of an irradiated nickel crystal : a molecular-dynamics based model.
D. RODNEY*, G. MARTIN, Y. BRECHET, J. de Phys. IV **10** (2000) 156-163.

210 Irradiation hardening by interstitial loops : atomistic study and micromechanical model
D. RODNEY, G. MARTIN, Y. BRECHET, Mat. Sci. Eng. **A 309-310** (2001) 198-202.

211+ Monte Carlo Simulation of NbC Precipitation Kinetics in aFe
D. GENDT*, P. MAUGIS, G. MARTIN, M. NASTAR, F. SOISSON
Defect and Diffusion Forum, **194-199** (2001) 1779-1786.

212+ Driven phase transformations: example of forced alloys
L. CHAFFRON, Y. LE BOUAR, G. SAINT AYES, G. MARTIN*
Revue de Métallurgie (Février 2003) 183-192.

213 Study of self-limiting oxidation of silicon nanoclusters by atomistic simulations
J. DALLA TORRE, J.L. BOCQUET, Y. LIMOGE, J.P. CROCOMBETTE, E. ADAM, G. MARTIN, T. BARON, P. RIVALLIN, P. MUR, J. Appl. Phys. **92** (2002) 1084-1094.

214 Coupled relaxation of concentration and order fields in the linear regime
P.BELLON, G.MARTIN, Phys. Rev. **B66** (2002) 184208.

215 Reactive solid state dewetting: interfacial cavitation in the system Ag Ni O
H. de MONESTROL, L. SCHMIRGELD-MIGNOT, S. POISSONNET, C. LEBOURGEOIS, G. MARTIN, Interface Science, **11** (2003) 379-390.

216 The elimination of irradiation point defects in crystalline solids: sink strengths
N.V. DOAN, G. MARTIN, Phys. Rev. **B67** (2003) 134107.

217 Taking advantage of the concept of Driven Alloys to study the wear of swift train wheels
Y. LE BOUAR, L. CHAFFRON, G. SAINT-AYES and G. MARTIN, Scripta Mater, **49** (2003) 985.

218 Sinks strengths revisited
N.V. DOAN, J.L. BOCQUET, G. MARTIN, Nucl. Inst. Meth. Phys. Res. **B202** (2003) 8-12.

219 Dislocation glide in model Ni(Al) solid solutions by molecular dynamics
E. RODARY, D. RODNEY, L. PROVILLE, Y. BRECHET, G. MARTIN
Phys.Rev. **B 70**, 054111 (2004).

220 Kinetic Monte Carlo Method to Model Diffusion Controlled Phase Transformations in the Solid State
G. MARTIN, F. SOISSON
in *Handbook of Materials Modeling* (Sidney Yip ed., Springer Netherland, 2005) 2223-2248.

221 A diffuse interface model for the interfacial transfer coefficient
G. MARTIN, Acta Materialia, **53** (2005) 2629-2632.

222+ Diffuse Interface Model for the Interfacial Transfer Coefficient
G. MARTIN*
Second International Conference on Multiscale Materials Modeling, N.M Ghoniem editor, (UCLA 2004), p. 291.

223 Precipitation kinetics of Al3Zr and Al3Sc in aluminum alloys modeled with cluster dynamics
E.CLOUET, A. BARBU, L. LAE, G. MARTIN, Acta Materialia, **53** (2005) 2313-2325.

224+ Reconciling the Classical Theory of Nucleation and Atomic Scale Observations and Modeling
G. MARTIN*
in *Solid-Solid Phase Transformations in Inorganic Materials 2005,* Edited by Howe et al, TMS , pp 291-299.

225 Atomic-scale study of dislocation glide in a model solid solution
L. PROVILLE, D. RODNEY, Y. BRECHET, G. MARTIN
Phil. Mag. **86**, 25-26 (2006), 3893-3920.

226 Nucleation problems in metallurgy of the solid state: recent developments and open question
Y. BRÉCHET, G. MARTIN, Comptes Rendus Physique/ *7*(9-10) (2006), 959--976.

227 CONTRIBUTION TO : "*LA FUSION NUCLÉAIRE: DE LA RECHERCHE FONDAMENTALE À LA PRODUCTION D'ÉNERGIE?".* ACADÉMIE DES SCIENCES, GUY LAVAL EDITOR, (EDP SCIENCES, 2007, ISBN 978-2-86883-862-9)

228 The mechanism of morphogenesis in a phase-separating concentrated multicomponent alloy
ZUGANG MAO, C.K. SUDBRACK, K.E. YOON, G. MARTIN, D. SEIDMAN

Nature Materials, **6**, 3 (2007), 210-216.

229 Kinetics in non-equilibrium alloys
P. BELLON, G. MARTIN
In *Alloy Physics,* Edited by W. Pfeiler, Wiley-VCH, Germany, 2007, pp 423-489.

230 Radiation effects in concentrated alloys and compounds: equilibrium and kinetics of driven systems
G. MARTIN, P. BELLON, Comptes Rendus PHYSIQUE **9**, 3-4 (2008), 323-334.

231 Contribution to: *"La Métallurgie"*, RST Nº 31, Académie des Sciences, Yves Quéré et André Pineau Editors, EDP, France, 2011.

232 Enhanced Annealing of the Dislocation Network under Irradiation
D. MORDEHAI, G. MARTIN, Phys. Rev. B in the press.

233 Kinetic pathways for phase separation: An atomic-scale study in Ni-Al-Cr alloys
ZUGANG MAO, C. BOOTH-MORRISON, C. K. SUDBRACK, G. MARTIN, D. N. SEIDMAN,
Acta Materialia **60** (2012) 1871–1888

234 A correlative four-dimensional study of phase-separation at the subnanoscale to nanoscale of a Ni-Al alloy, Elizaveta Y. Plotnikov, Zugang Mao, Sung-Il Baik, Mehmet Yildirim, Yongsheng Li , Daniel Cecchetti, Ronald D. Noebe, Georges Martin, David N. Seidman
Acta Materialia 171 (2019) 306-333

Technical reports:

R1 Tables de valeurs numériques pour les études de diffusion intergranulaire (Numerical tables for grain-boundary diffusion studies)
G. MARTIN, Report C.E.A. - R - 4363 (1972).

R2+ Modélisation de la précipitation dans les superalliages polyconstitués : de l'échelle atomique à l'échelle macroscopique (Modelling precipitation in multicomponent superalloys: from atomic scale up to macroscale)
T.A. ABINANDANAN, P. BELLON, G. MARTIN*, Colloque SNECMA, Evry 1993. 389.

R3 Pre and post irradiation properties of brazed joinings: microstructural stability of BNi7 under irradiation and modelling under NET conditions (Final report PSM4-2)
L. BOULANGER, P. BELLON, Y. SERRUYS, G. MARTIN, Note technique SRMP-93/51 (1993).

R4 Pre- and post-irradiation properties of brazed joinings: microstructural stability of copper/CFC and TZM/CFC under irradiations and modelling under NET conditions (Final report PPM5-7)
L. BOULANGER, P. BELLON, Y. SERRUYS, G. MARTIN, Note technique SRMP-93/51 (1993).

R5 Dose, Flux, Fluence
G. MARTIN, CEA- Note technique SRMP - 97.83

R6 Structure électronique des matériaux : CEA civil (Electronic structure of materials)
J.P. CROCOMBETTE, R. GUPTA, Y. LIMOGE, G. MARTIN
Note Technique SRMP 97-84 (1997).

R7 Section de Recherches de Métallurgie Physique : Résultats (1990-1998) et perspectives.
(Physical metallurgy section : results and prospects)
G. MARTIN and coworkers, CEA-Note technique SRMP- 98-93.

R8 Relations entre la SRMP et la Technologie, en particulier à SRMA et SCECF
(connections between SRMP and technological laboratories)
G. MARTIN and coworkers CEA-Note SRMP- 99-01.

R9 Phénomènes activés thermiquement et processus à seuil: *application au cyclage thermique*
(Thermally activated processes and thresholds: *application to thermal cycling*)
G. MARTIN, CEA-Note SRMP-99-06.

R10 Commentaires sur l'effet du rayon d'une sphère sur sa vitesse d'oxydation : cas du silicium
(Comments on the effect of the radius of a spherical body on its oxydation rate)
G. MARTIN, J.L. BOCQUET, Y. LIMOGE, Y. Le BOUAR, CEA-Note SRMP-00-01.