RESEAU FRANCAIS DE MECANOSYNTHESE

Lettre N°29

Août 1997

75 Groupes de Recherches (16 Etrangers) - 107 (+2) Correspondants

Bureau : E. Gaffet (Président), G. Le Caër (Secrétaire Général), A.R. Yavari (Trésorier)

2 Nouvelles Adhésions

S. Rimlinger - CERMEP - Grenoble - France

J.-P. Touboul - Engelhard - CLAL - Noisy le Sec- France

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Assises des Matériaux - CNRS

Au cours des Assises des Matériaux (Lyon - 15 et 16 Décembre 1997), seront présentées et discutées les conclusions de l'analyse stratégique et présenté le nouveau programme du CNRS.

Une intervention au nom des 32 Sociétés Savantes et Associations concernées par la recherche sur les matériaux est prévue au cours de cette manifestion. Y. Farge, Président de la Société Française de Métallurgie et de Matériaux, sollicité par G. Beck, a accepté de présenter cette contribution.

Afin de construire cette intervention, Y. Farge nous sollicite afin de connaitre l'avis du RFM sur le bilan et les propositions permettant d'améliorer la recherche sur les matériaux menée en France.La réponse au nom du RFM doit lui parvenir avant le 1er Octobre 1997.

Tout membre du RFM est donc invité à me faire parvenir tout document qu'il jugera utile avant le 15 Septembre 1997, afin que nous puissions rédiger une note présentant la contribution du RFM à cette réflexion sur l'avenir de la recherche sur les matériaux. Cette note de synthèse sera diffusée prochainement dans la lettre du RFM.

E. Gaffet

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ANNONCE DE CONGRES ET / OU ECOLES

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Thermal spray processing of Nanoscale Materials
Davos - 3 - 8 Août 1997
Contact : E. Lavernia (Irvine - USA) E_Mail : E.Lavernia@uci.edu

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2nd International Conference on Mechanochemistry and Mechanical Activation (INCOME - 2)
Novosibirsk - Russie - 12 - 16 Août 1997
Contact : Prof. N. Lyakhov - Institute of Solid State Chemistry - Kutateladze 18 - Novosibirsk 630128 - Russie
E_Mail : Conf@solid.nsk.su - Fax : 7 (383) - 2) 32 28 47 - Tel. 7 (383 - 2)32 86 83

ISMANAM97
Sitjes (Barcelone) - 31 Août - 5 Sept. 1997
Contact : M.D. Baro Fax : (+34) - 3 - 581 - 2155 - E_Mail : Ismanam97@cc.uab.es

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Mechanical Behavior of Bulk Nanocrystalline Solids"
Indianapolis - TMS Fall Meeting - 14 - 18 Septembre 1997
Contact : Naresh.Thadhani@msi.gatech.edu

EUROSOLID 4
European Conference on Transformation Kinetics and Reactivity of Solids
St Vincent - Vallée d'Aoste - Italie 15 - 16 Septembre 1997
Contact : L. Montanaro - General Secretary of EUROSOLID 4 - Dipartimento di Scienza dei Materiali ed Ingegneria Chimica - Politecnico - Coso Duca degli Abruzzi, 24-I-10129 Torino - Italie

E_Mail : Negro@athena.polito.it

Colloque National sur les Contraintes Résiduelles dans les procédés d'élaboration des Céramiques et des Traitements de Surface
Limoges - France 23 - 24 Septembre 1997
Contact : Prof. F. Nardou - LMCTS / CNRS ESA 6016 - Faculté des Sciences - 123 Avenue A. Thomas - 87060 Limoges Cedex - France - Tél : 05 55 45 74 87 - Fax 05 55 45 75 86 - E_MAil : Nardou@unilim.fr

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2nd Int. Symposium on Structural Intermetallics
Champion (PA - USA) - 21 - 25 Septembre 1997
Contact : B. Kamperman , T.M.S., 420 Commonwealth, Warrendale, PA 15086 - E_Mail : Kamperman@tms.org

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2nd European Meeting on Integrated Ferroelectrics

Jouy en Josas - France - 29 - 30 Septembre 1997
Contact : P.Abelard@ensci.fr

2ème Symposium Normand de la Forge Européenne
De la Paléométallurgie à l'Innovation
(Métallurgie des Poudres et Frittage)
Notre Dame de Gravenchon - 4 - 12 Octobre 1997
Contact : Elementa - Gare d'Etainhus - 76430 Etainhus

4th Int.Symp. on Self Propagating High Temperature Synthesis
Tolede - 6 - 10 Octobre 1997
Contact : Institut de Céramique et du Verre - Fax (+34) 1 - 870 - 05 - 50

4th Int. Symposium on Electrochemical / Chemical Reactivity of Amorphous and Nanocrystalline Alloys
Dresden - 8 - 10 Octobre 1997
Contact : L. Shultz / A. Gebert - Institute of Solid State and Materials Research Dresden - P.O. Box 270016 - 01171 Dresden - Allemagne : Fax : +(49) 351 - 4659 - 541 - e-Mail : Schultz ou gebert @ifw-dresden.de

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Réunion J2IM - Joints Intergranulaires et Interphases

NOUVEAU

8 - 10 Octobre 1997
Contacts : http://sivet1.glvt-cnrs.fr/J2IM/index.htmlx

European Conference on Advances in Structural PM Component Production - PM97
Munich - 15 - 17 Octobre 1997
Contact : Euro PM97 Conference Secrétariat - European Powder Metallurgy Association OLD Bank Buildings, Bellstone, Shrewsbury SY1 1HU, UK-Fax : +44 1743 362968 - E_Mail : epma@dial.pipex.com

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JA97

Paris - Maison de la Chimie - 25 - 27 Novembre 1997

MRS Fall Meeting 97

Symposium B : Phase Transformations and Systems Driven Far From Equilibrium"
Boston - 1 - 5 December 1997
Org. : M. Atzmon, P. Bellon, E. Ma, R. Trivedi - **Contact :** MRS Website

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Surface - Controlled Nanoscale Materials for High Added Value Applications

NOUVEAU

MRS Fall Meeting
Boston - 1 - 5 December 1997
Org. : M.-I. Baraton, K.E. Gonsalves, J.X. Chen, J.A. Akkara
Contact : M.-I. Baraton E_Mail : Baraton@unilim.fr

The 7th Joint MMM-Intermag Conference

San Francisco - 6 - 9 Janvier 1998
Web Site : http://www.aip.org/edops/mmmconf.html

Society of Automotive Engineers Congress

Cobo Center - Detroit - Michigan - USA - 24 Fevrier 1998
E_Mail : SAE@SAE.Org

29èmes Journées de Cinétique Hétérogène

Université Paris XI - Orsay - Printemps
Org. : A.M. Huntz - **Contact :** G. Thomas (Thomas@emse.fr)

Oxydes Magnétiques

Journées d'Etudes - Dijon 24 - 26 Mars 1998
Contact : J.C. Niepce - L2RS CNRS UPR5613
Faculté des Sciences de Mirande - 9 Avenue A. Savary - BP 400 - 21011 Dijon Cedex
E_Mail : JOXMAG@U-BOURGOGNE.Fr

Colloque National de Métallurgie des Poudres

Efets de la microstructure et de la porosié sur les propriétés mécaniques et physiques des matériaux MdP
Grenoble - 6 - 8 Avril 1998 - Org. SF2M

CIMTEC'98 - World Ceramics Congress and Forum on New Materials

Florence - 14 - 19 Juin 1998
Web Site : http://www.dinamica.it/cimtec98/

3rd International Symposium on Metallic Multilayers (MML'98)

NOUVEAU
Vancouver - 14 - 19 Juin 1998
Contact : E_MAil : Conference_Service@SFU.CA

Congrès Européen sur le Broyage

Albi - 8 - 10 Septembre 1998 - sous l'égide de l'European Federation of Chemical Engineering
Contacts : P. Guigon et J. Dodds

Powder Metallurgy 98

Granada - Espagne - 18 - 22 Octobre 1998
Site Web : http://www.epma.com/congress/

Bibliographie Récente

N.B. : En cas de difficultés à vous procurer une copie des articles suivants, n'hésitez pas à contacter E. Gaffet (CNRS / IPSé - Belfort)

Livres ou "Special Issues"

"Chemical MechanoSynthesis of Nanomaterials"
The International Journal of Non - Equilibrium Processing - Guest Editor : E. Gaffet - disponible 1998
Editeur : A.L. Greer, Editeurs Associés : M. Atzmon, L. Battezzati, M. Umemoto

"Mécanosynthèse"
Les Annales de Chimie - Science des Matériaux - Coordinateur G. Le Caër (1997) - disponible Juillet 97

Les Matériaux à Grains Ultrafins produits par Hypercorroyage"
Les Annales de Chimie - Science des Matériaux - Coordinateur R.Z. Valiev (1997)

Proceedings International conference on Nano Clusters and Granular Materials Sendai (1995)
Materials Science & Engineering A-Structural Materials Properties Microstructure & Processing. 217:R 11, 1996

Proceeding du Congrès "Mechanically Alloyed and Nanocrystalline Materials" - Rome (1996)
Editor : D. Firoani, M. Magini - Materials Science Forum - Volumes 235 - 238 (1997)

Proceeding du Congrès "Mechanically Alloyed and Nanocrystalline Materials" - Québec (1995)
Editor : R. Schulz - Materials Science Forum - Volumes 225 - 227 (1996))

"Mechanical Properties & Deformation Behavior of Materials having Ultra-fine Microstructures"
Ed. M. Nastasi, D.M. Parkin, H. Gleiter - Nato ASI Series. Ser. E : Appl. Sci. Vol. 233 (1993)

Proceeding du Congrès "Mechanically Alloyed and Nanocrystalline Materials" - Grenoble (1994)
Editor : A.R. Yavari - Materials Science Forum Volumes 179 - 181 (1995)

"Mechanochemistry of Solid Surfaces"
E.M. Gutman (Ben - Gurion University of the Negev) - World Sci. Pub Co. Pte. Ltd (1994) - ISBN 981-02-1781-1

Thèses Etrangères (disponible sur demande auprès de E. Gaffet)

"Microstructure and phase transformation in mechanically alloyed materials" (En Anglais)
J.Y. - Huang - Lab. Atomic Imaging of Solids - Shenyang - Chine - Systèmes Etudiés : Cu, Co, Fe - Cu, Ti - Ni - C

Périodiques (Rubrique assurée en partie grâce au concours de Mme TAUZIN - FIN BiPSé)

EFFECTS OF PRESSURE AND TEMPERATURE ON CONSOLIDATION OF NANOCRYSTALLINE MA POWDER OF AL-10.7AT-PERCENT-TI-0.6AT-PERCENT-FE SUPERSATURATED SOLID SOLUTION
Araki H. Saji S. Okabe T. Minamino Y. Yamane T. Miyamoto Y. - Mat. Trans. Jim. 38(3):247-254, 1997
The powder of a single phase of the Al-10.7 at%Ti-0.6 al%Fe supersaturated solid solution with an average crystallite size of 11 nm has been obtained from a pure Al and Ti mixed powder by means of a high energy planetary ball mill. The mechanically alloyed (MA) powder was consolidated into cylinders 4 mm in diameter and 2.5 mm in height at temperatures of 473 similar to 773 K under hydrostatic pressures of 0.1 MPa similar to 3 GPa. The consolidation at high temperatures causes the decomposition of the supersaturated solid solution obtained by MA, whereas the compacts consolidated at low temperatures retain the supersaturated solid solution and nanostructure. The upper limiting temperature where the compact can retain the supersaturated solid solution becomes higher with increasing consolidation pressure, and the application of high pressure consequently permits consolidating the MA powder at higher temperature without decomposing the supersaturated solid solution. On the other hand, the higher consolidation pressure and temperature can give higher density and hardness to the compact. Thus the application of high pressure is effective for the consolidation of MA powder with the retention of the supersaturation and nanostructure.

FORMATION OF NANOCRYSTALLINE FCC PHASE BY MECHANICALLY DRIVEN CRYSTALLIZATION
Wu NQ. Wu JM. Li ZZ. Wang GX. - Materials Transactions Jim. 38(3):255-259, 1997

Ball milling has been performed on the Al-Ti and Al-Ti-C powder mixtures in a planetary ball mill. The structural changes of the as-milled powder samples have been characterized by X-ray diffraction (XRD), transmission electron microscopy (TEM) and differential thermal analysis (DTA). The results obtained show that an amorphous phase is formed at an early milling stage, and transits later to a nanocrystalline f.c.c. metastable phases. In addition, crystallization of the amorphous phase upon heating results in the equilibrium phases instead of the f.c.c. phase. This indicates that the crystallization induced by ball milling is different from that by annealing. The contamination of nitrogen and oxygen has a significant influence on the crystallization during ball milling.

FORMATION KINETICS OF NANOCRYSTALLINE FE-4WT.PERCENT-AL SOLID SOLUTION DURING BALL MILLING

Jiang HG. Perez RJ. Lau ML. Lavernia EJ. - Journal of Materials Research. 12(6):1429-1432, 1997

Formation of nanocrystalline Fe-4 wt. % Al solid solution has been achieved through SPEX ball milling of blended elemental Fe and Al powders. Differential scanning calorimetry (DSC) and x-ray diffraction (XRD) have been employed to follow the structural evolution during the ball-milling process. Exothermic peaks exhibited in DSC diagrams of the powders milled for 10 to 60 min yielded thermal enthalpies corresponding to the formation of Fe-4 wt. % Al solid solution, from which the kinetics of formation were found to follow the Johnson-MeN-Avrami equation. Assessment of the kinetic parameter n reveals a diffusion controlled mechanism, in which grain and interphase boundaries may play a crucial role, during the solid solution formation of Fe-4 wt, % Al.

HIGH ENERGY BALL-MILLED TI2RUFE ELECTROCATALYST FOR HYDROGEN EVOLUTION IN THE CHLORATE INDUSTRY

Blouin M. Guay D. Huot J. Schulz R. - Journal of Materials Research. 12(6):1492-1500, 1997

The high energy mechanical alloying of a Ti-Ru-Fe powder mixture (atomic ratio 2:1:1) has been performed by extensive ball-milling in a steel crucible, The structural evolution of the resulting materials has been studied by x-ray powder diffraction analysis, The identification of the various phases present in the materials, as well as the crystallite size and strain, has been performed by Rietveld refinement analysis. Ln the first stage of the material transformation, Ru or Fe atoms dissolved into Ti to yield to the formation of beta-Ti. Upon further ball-milling, almost all the original constituents of the powder mixture have disappeared and a new simple cubic Ti2RuFe phase is formed, with a crystallite size as small as 8 nm. The electrochemical properties of these materials have been tested in a typical chlorate electrolyte by cold-pressing the powders into disk electrodes. At 20 h of ball-milling, where the phase concentration of Ti2RuFe reaches 96%, a reduction of the activation overpotential at 250 mA cm(-2) of nearly 250 mV is observed when compared to that of a pure iron electrode.

SYNTHESIS OF NANOSTRUCTURED MATERIALS BY MECHANICAL MILLING - PROBLEMS AND OPPORTUNITIES

Koch CC. - Nanostructured Materials. 9(1-8):13-22, 1997.

Mechanical attrition as a method to produce nanocrystalline (nc) materials is reviewed. its advantages include the fact that all classes of materials-including brittle compounds-are amenable to the method; it can be easily scaled up to tonnage quantities. The phenomenology and suggested mechanisms for formation of nc microstructures are discussed for ball milling of single component powders, mechanical alloying of multicomponent powders, and mechanical crystallization of amorphous alloys. The phenomenology is well documented but microscopic mechanisms await better understanding of the nature of deformation processes in nc materials. The problems of contamination and powder consolidation are briefly considered. (C) 1997 Acta Metallurgica Inc.

GRAIN SIZE STABILITY OF NANOCRYSTALLINE CRYOMILLED FE-3WT-PERCENT-AL ALLOY

Perez RJ. Jiang HG. Lavernia EJ. - Nanostructured Materials. 9(1-8):71-74, 1997.

Nanocrystalline Fe-3wt.%Al alloy powders are synthesized using cryogenic mechanical alloying in liquid N. Uptake of O by the powders is significantly reduced by controlling the atmosphere and pressure during milling. The initial 18 nm grain size of the cryomilled powder is found to experience grain growth at temperatures above 500 degrees C (0.42 T-m), as determined by X-ray diffraction. Cryomilled pure Fe, in contrast, is found to be significantly less stable. Transmission electron microscopy indicates that the grain growth in the Fe-3wt.%Al is abnormal, while lattice parameter measurements indicate limited dissolution of Al in the Fe matrix.

COLD COMPACTION OF NANOGRAIN IRON ALLOYS

Munitz A. Livne Z. Rawers JC. Fields RJ. - Nanostructured Materials. 9(1-8):89-92, 1997.

A new cold consolidation technique is presented that can produce high density high hardness compacts from ball-milled powders. Ball-milling produces extremely hard, micrometer size particles, made up of nanometer size grains, that resist most methods of cold consolidation. Cold compaction of bcc-Fe and fcc-Fe alloys was accomplished statically and dynamically by cold isostatic pressure, CIP, and cold dynamic compaction, CDC, respectively. Characterization of the resulting compacts and microstructure included optical and scanning electron microscopy, microhardness measurements, and density measurements. The powders were initially either compacted using 0.35 GPa CIP or compacted in a die up to 2.5 GPa. The CIPed compacts of ball-milled powders had a low density of approximately 60%, low hardness, 100 H-v, and no microstructural sign of interparticle bonding. Increasing the compaction pressure to 2.5 GPa increased the density to about 72%, but did not improve bonding. CIPed powder compacts were placed on the anvil of a drop weight impact tester and subjected to drop weight impact-CDC. The resulting compacts had densities approaching 95% of the theoretical values. In some cases the hardness of ball-milled powder compacts exceeded 1400 H-v, and the microstructure showed that intimate particle contact was achieved. There was also evidence of a significant transient temperature rise during dynamic compaction.

NANOCRYSTRALLINE PHASES IN CU-NI, CU-ZN AND NI-AL SYSTEMS BY MECHANICAL ALLOYING

Pabi SK. Joardar J. Manna I. Murty BS. - Nanostructured Materials. 9(1-8):149-152, 1997.

Nanocrystalline solid solutions and intermetallic phases in Cu-Ni (enthalpy of formation, Delta H-f approximate to 2kJ/mol), Cu-Zn(Delta H-f approximate to-8kJ/mol) and disordered Ni3Al (Delta H-f approximate to-42kJ/mol) in Ni-Al system formed during mechanical alloying (MA) through conventional continuous diffusive mixing mechanism. In contrast, nanocrystalline ordered NiAl (Delta H-f=-72kJ/mol) and NiAl3 (Delta H-f=-39kJ/mol) formed during MA by a discontinuous additive mixing mechanism. Ternary additions of Fe and Cr made the as-milled NiAl phase disordered, and the alloying mechanism changed over to the continous diffusive mode.

SYNTHESIS AND CHARACTERIZATION OF BULK NANOCRYSTALLINE M50 STEEL BY CRYOMILLING

Lau ML. Jiang HG. Perez RJ. Juarezislas J. - Nanostructured Materials. 9(1-8):157-160, 1997.

Nanocrystalline high speed tool steel M50 (4.5%Mo, 4.0%Cr, 1.0%V, 0.8%C, balance Fe) was synthesized by cryogenic high energy ball milling (cryomilling) for 25 hours. Elemental Al powder is added prior to cryomilling in order to promote the formation of nanoscale Al2O3 and AlN dispersoids in an effort to improve the thermal stability of the nanocrystalline M50 steel. High resolution transmission electron microscopy (HRTEM) reveals the formation of various carbides (V8C7, Fe3C, and FeC), oxides (Al2O3 MoO3 and V3O7), and a nitride phase (AIN) during cryomilling. The nanocrystalline M50-5 wt.% Al powders are consolidated using hot isostatic pressing (HIP) at 1223 K and 200 MPa for 2 hours. X-ray diffraction analysis performed on the consolidated M50-5 wt.% Al compact yields an average calculated grain size of 23 nm. Furthermore, TEM dark field imaging indicates that an average grain size of 17 +/- 11 nm is retained for the bulk nanocrystalline M50-5 wt. % Al consolidated by HIP.

MECHANICAL SYNTHESIS OF NANOCRYSTALLINE ALPHA-AL2O3 SEEDS FOR ENHANCED TRANSFORMATION KINETICS

Panchula ML. Ying JY. - Nanostructured Materials. 9(1-8):161-164, 1997.

The mechanical synthesis of nanocrystalline alpha-Al2O3 seeds from gamma-Al2O3 to enhance the phase transformation kinetics of alumina is described. The effect of milling rime on crystallite size, transformation temperature, transformation kinetics, and seed density are reported. it is shown that the transformation rate can be increased by several orders of magnitude by milling the material for short time periods.

FABRICATION AND MECHANICAL PROPERTIES OF NANOSIZED SIC PARTICULATE REINFORCED YTTRIA STABILIZED ZIRCONIA COMPOSITES

Bamba N. Choa YH. Niihara K. - Nanostructured Materials. 9(1-8):497-500, 1997.

Nanocomposite technology was applied to 8 mol% yttria fully-stabilized zirconia (8YSZ) for improving its mechanical properties. 8YSZ and nanosized SiC powders with particle size of 40 to 100 nm were homogeneously mixed in ethanol using a ball milling technique. After milling, the mixed powders were sintered by hot-pressing routes Transmission electron microscopy (TEM) observations revealed that nanosized SIC particles were homogeneously dispersed within the 8YSZ matrix grains and at grain boundaries. The fracture strength was improved two to three rimes compared with the monolithic 8YSZ. Maximum strength of 750 MPa was obtained for the 8YSZ/20vol.% SiC nanocomposite. This strength improvement may be due refine and homogeneous microstructure and to the compressive internal stresses caused by thermal mismatch between the 8YSZ and SiC particulates.

A STUDY OF NANOCRYSTALLINE BINARY FE80CU20 AND MULTICOMPONENT FE81CU1SI9B6NB3 ALLOYS PREPARED BY MECHANICAL ALLOYING

Frattini R. Mulas G. Enzo S. Cowlam N. - Nanostructured Materials. 9(1-8):513-518, 1997

A series of Fe100-xCux alloys were made by mechanical alloying (MA) for comparison with the multicomponent Fe81Cu1Si9B6Nb3 (FINEMET) composition, which was also prepared by the MA technique. This latter alloy is usually prepared with an amorphous structure by the melt quenching technique and subsequently annealed to produce a nanocrystalline material. X-ray and neutron experiments have been made on the Fe-Cu and FINEMET alloys to investigate the evolution of their structures as a function of time of MA treatment. The results suggest that the multicomponent Fe81Cu1Si9B6Nb3 has more pronounced nanocrystalline properties in comparison with the binary BCC Fe80Cu20 extended solid solution.

CORRELATION BETWEEN THE GRAIN-SHAPE AND MAGNETIC PROPERTIES IN NANOCRYSTALLINE IRON

Szabo S. Beke DL. Harasztosi L. Daroczi L. Posgay G. Kisvarga M. - Nanostr. Materials. 9(1-8):527-530, 1997.

Correlation between magnetic properties and time evolution of size (d) and shape of grains of pure nanocrystalline iron produced by ball-milling were investigated by Barkhausen-noise and low field magnetization measurements. Strong texture and elongated grain structure were developed after some hours milling time, and the thickness of elongated grains was in accordance with the grain size obtained from X-ray line broadening. After prolonged milling, disruption of the elongated grains and development of equiaxed grain structure was observed. There was a maximum in the Barkhausen-noise when the above lamellar structure was the most typical. It is shown that the coercive force (Hc) is not sensitive to the formation of the grain structure, but the course of the Hc(d) curve strongly depends on the initial and preparation conditions. In accordance with our previous remits, the saturation magnetization was independent of the grain size.

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N.B. : Pour la rédaction du prochain N° de la Lettre du Réseau Français de Mécanosynthèse, tout(e) article, annonce, thèse ... peut être envoyé(e) à Eric Gaffet - CNRS UPR A0423 - Groupe "Elaboration et Transitions de Phases Hors Equilibre" - IPSé - F90010 Belfort Cedex - Tél. : 84 - 58 - 31 - 02 / Fax : 84 - 58 - 30 - 27 ou par E-mail

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BOURSE de L'EMPLOI

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- **Japon : Possibilite de Post - Doc - Contacter E. Gaffet**
- **Italie : Possibilité de Post - Doc - Contacter E. Gaffet**

- **Graduate Research Assistantship :** MS Ph D level (début janvier ou Août 1997), focusing in situ formation of advanced high temperature MMC, sol gel surface modification of fibers incorporation in advanced metallic and ceramic systems and metallurgy of advanced alloys for high speed civil transport and biomedical applications. Contact : Prof. H.J. Rack - School of Chemical and Materials Engineering - 208 Rhodes Hall - Clemson University - Clemson, SC 29634 - 0922 - E_Mail : Rackh@ces.clemson.edu
- **Europe :** Des institutions européennes ayant obtenu un contrat dans le cadre du programme européen "Formation et Mobilité des Chercheurs - activité Réseaux" recherchent des pré - doc et post doc dans les disciplines suivantes : Chimie, Sciences de la Vie, Mathématiques et Sciences de l'Information - Physique - Contact : magnabos@dr6.cnrs.fr (source Quadrilatère N°44)

DEMANDES

- **Pascal Pochet :** 28 Ans - Docteur en Science des Matériaux (soutenance le 6/01/97) Ingénieur Chimiste - Domaine : Métallurgie Physique, Changements de phases sous sollicitation extérieure, mécanosynthèse, Génie des Procédés - Techniques : Caractérisation des matériaux (DRX, ATD-TG, MEB, MET), techniques de métallurgie des poudres, simulations numériques (Monte Carlo) sur stations de travail - Résultats : Identification des paramètres de broyage qui controlent l'état final du produtio (ordre - désordre dans FeAl, précipitation dans NiGe) Modélisation du processus à l'échelle atomique, découverte de microstructures inhabituelles - Publications : Phys Rev. B, Mater. Sci. For., MRS Symp. ISMANAM95 (conf. invité), J. Phys. - Divers, Anglais, Unix, Fortran 77.
- **Dr. F. Guo - Jiang** recherche Post Doc en France : **s**trongly recommended by Prof. H. Zhuang - Qi - Academician, Director of State Key Laboratory of NonEquilibrium Alloys.
- **Dr. Xinqing Zhao** (Beijing - Chine) recherche post - doc en France - Domaines de compétences : "Preparation and Characterization of Fe - base nanoparticles, including iron, iron nitride and carbide as well as carbonitride ultrafine particles, Phase transformation and transformation thermodynamics of the naocrystalline particles, Microstructure and magnetic properties of Fe - base nanoparticles.(13 Articles à Comité de Lecture) E_Mail : zjz-dms@mail.tsinghua.edu.cn
- **Dr. K. Wang** (Shawneetown - USA) recherche post doc en France - Domaine d'activités ; Mechanical alloying, Powder Metallurgy, Mechanical Metallurgy, Solid State Physics and Physical Chemistry, Formability of Al alloys. PhD en 1992 au State Key Lab for RSA Shenyang Chine " Mechanism of Mechanical Alloying under different Conditions"
- **Dr. Y.L. Chen** (Beijing - Chine) recherche post doc en France - Domaine d'activités ; Mechanical alloying of ZrO_2, CeO_2, Y_2O_3, CaO, TEM, rapid solidification, High temperature low frequency fatique of superalloys - E_Mail jlshcc5.imech.ac.cn
- **Dr. M. Hussain** (Mirpur - Bengladesh) recherche post - doc en France- Domaines d'activités ; Preparation and structure determination of Inorganic Glasses, Fabrication of epoxy based Ceramic Composites

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• D. Guerard (1997)	**Lab. Chimie du Sol. Minéral - CNRS** - B.P. 239 - Vandoeuvre les Nancy Cedex
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• D. Klein	LMIT - Portes du Jura - F25000 Montbéliard
• F.A. Kuhnast	LCSM -URA CNRS 158 - Univ. H. Poincaré - Nancy I - F54506 Vandoeuvre Cedex
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Le RFM a entamé sa Troisième Année d'existence,
Merci de penser à vos adhésions au titre de l'Année 1997.
Les membres du RFM ayant déjà réglé leur cotisation sont indiqués sur l'annuaire par (1997)

Bulletin d'adhésion 1997 (*à retourner à l'adresse suivante) :*

Eric GAFFET

UPR CNRS 423 - Groupe "Elaboration et Transitions de Phases Hors Equilibre" - IPSé - F90010 - Belfort Cedex

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désire adhérer au Réseau Français de Mécanosynthèse

*(Joindre un chèque de 100 F, à l'ordre du Réseau Français de Mécanosynthèse, représentant la cotisation pour l'année **1997**)*

à le **1997**

(Signature)