European Networks Focus on Advanced Materials

The European Networks on Advanced Materials were established in 1987 to enhance scientific and technical cooperation between research teams from different countries. With the assistance of industrial and public institutions and with the support of the Council of Europe and the Commission of the European Communities, the European Materials Research Society is continuing to develop these networks. Eleven networks have established programs, and three are in the initial stages of development (see Table).

This article is part of a continuing series that focuses on the philosophies, aims and activities of the separate networks as described by their chairmen. Featured this month are Network 4 on New Methods in Metastable Alloy Production and Network 5 on High Resolution and High Sensitive Analysis of Semiconductors.

A brochure detailing all the networks is available from: P. Siffert, Chairman, European Materials Research Society, Centre de Recherches Nucléaires, 23, rue de Loess, F-67037, Strasbourg, France; telephone 88 28 65 43; fax 88 28 09 90.

Network 4—New Methods in Metastable Alloy Production

Chairmen: J. Bottiger, Institute of Physics, Aarhus University, Denmark; B. Stritzker, Kernforschungsanlage, Jülich, W. Germany; M. Von Allmen, CM-S.A. Biel, Switzerland.

Metastable alloys (i.e., extended solid solutions, amorphous alloys, microcrystalline phases) are at present, due to their unique properties, finding their way into various industrial products. Metallic glasses, for example, have a combination of magnetic and mechanical properties which makes them very suitable in various electrical products.

Large-scale production of metastable alloys is traditionally carried out by melt-spinning (i.e., fast quenching from the melt) but new methods of production have appeared in recent years. As examples, amorphous alloys can be formed by solid-state reactions (i.e. isothermal annealing) at sufficiently low temperatures that crystalline compounds will not be formed, by ion or laser irradiations, and by ball-milling (mechanical alloying). The physical mechanisms involved in the various new production methods are at present being studied very intensively in many European laboratories. The physical and chemical properties of this new class of alloys are also being investigated.

Nineteen laboratories from nine countries are participating in this network: CM-S.A., Biel; Natuurkundig Laboratorium der Universität van Amsterdam; Istituto di Chimica Generale ed Inorganica, Torino; Institute of Physics, University of Aarhus; Metallurgy Division, School of Materials, University of Sheffield; Physics Institute, Univ. d.Bw. Munchen,, Neubiberg; University of Cambridge, Department of Metallurgy and Materials Science; Institute of Applied Physics, Univ. Berne; Department of Electronics & Electrical Engineering, Salford University; Laboratoire Mixte CNRS-Saint Gobain; Physics Department, University of Padova, Italy; Institute of Structural Metallurgy, University of Neuchatel; Physics Department, University of Catania; Laboratoire de Metallurgie Physique, Poitiers; Erstes Physikalisches Institut der Georg-August-Universitat Gottingen; Department of Powder Metallurgy, Drottning Kristinas, Stockholm; Siemens AG, Erlangen; Centro de Fisica Nuclear, Lisbon; IFF-KFA, Julich.

E-MRS Networks on Advanced Materials

Network Number	Theme	Group Leaders
1	Laser chemistry	K.L. Kompa, E.F. Krimmel (FRG)
2	Solid state ionics	M. Balkanski (France)
3	Modeling of solidification	H. Fredriksson (Sweden)
4	Metastable alloy production	J. Bottiger, B. Stritzker, M. von Allmen (Denmark, FRG, Switzerland)
5	Microanalysis of semiconductors	E. Sirtl, A. Cullis (FRG, UK)
6	High energy ion implantation	G.G. Bentini (Italy)
7	II-VI Te-based semiconductors	R. Triboulet (France)
8	Biomaterials	D. Muster (France)
9	Gallium arsenide	H.S. Rupprecht, W. Wettling (FRG)
10	Metal matrix composites	G. Chadwick (UK)
11	Electroactive polymers	M. Zerbi (Italy)

Emerging Networks: Superconducting ceramics, Materials under microgravity, InP and related III-IV materials.

Network 5—High Resolution and High Sensitive Analysis of Semiconductors

Chairmen: E. Sirtl, Heliotronic-Wacker, Burghausen, W. Germany; A.G. Cullis, Royal Signals and Radar Establishment, Malvern, United Kingdom.

High resolution and high sensitivity analysis of semiconductors is fundamental to semiconductor investigations, from basic research to device development. In a first step, this project will concentrate on the introduction, behavior, and effects of H in crystalline silicon. Different analytical techniques will be used. In particular, high resolution transmission electron microscopy will be applied to imaging lattice defects in H-doped semiconductors. Several high sensitive techniques will also be applied: bulk analysis by effusion, SIMS, or neutron activation; structural analysis by x-ray, neutron, or γ-diffraction, and by channeling techniques like RBS; electronic analysis (deep level spectroscopy, carrier lifetime measurements); and electronic analysis of interfaces (e.g., Si-SiO_2 interface or grain boundaries).

The research program will concentrate on the following: (1) thermodynamic properties of H in semiconductors, (2) interaction of H with lattice and impurities, (3) interaction of H with point defects, and (4) interaction of H with line defects and interfaces or grain boundaries, respectively.

Participating laboratories in this network are as follows: INSA de Lyon, Villeurbanne; Imperial College, London; University of Oxford; CNRS Meudon; CNR-MASPEC, Parma; IAF Freiburg; UPMC, Paris; CNR LAMEL, Bologna; University of Ferrara; University of Milano; IRST Povo; University of Lund; University of Panama; University of Marseille; University of Milano; CRN Strasbourg; MPI-FKF, Stuttgart; University of Paris; University of Cologne; University of Reading; MPI-FKF, Stuttgart; University of Amsterdam; RSRE Malvern; University of Erlangen; Erlangen; CNR Roma; University of Bologna; University of Ferrara. □

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