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 is Network 10 on Pressure Casting and Metal Matrix Composites.

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 10—Pressure Casting and Metal Matrix Composites

Chairman: G.A. Chadwick, University of Southampton, United Kingdom.

For many years, metal matrix composites have held the promise of improved mechanical properties of engineering structures. However, it is only within the last five years or so that metal matrix composites have been produced on a commercial scale for volume production. The most successful route of manufacture to date has been by squeeze casting, a process currently used industrially in several European countries, although other processes such as low pressure infiltration and spray codeposition are being used. Both aluminum and magnesium alloys are being studied as matrix phases; and graphite, alumina, silicon carbide and steel wires are being used as the reinforcement phases.

Remarkable properties can be achieved with metal matrix composites. Extremely high moduli of elasticity are attainable with the use of stiff nonmetallic fibers, and extraordinary wear resistance is attainable with particulate reinforced composites. It has been shown that the fatigue behavior of conventional metallic materials can be improved by orders of magnitude when metal matrix composites are used. Similarly, the high temperature strength of metal matrix composites can be far superior to that of the unreinforced alloys. Known improvements in mechanical properties of metal matrix composites are allowing significant design changes which lead to guaranteed longer lifetimes and higher efficiencies of the engineering materials and the machines in which they operate in the aerospace, automotive and general engineering industries.

Network 10 is exploring ways of stimulating collaborative research across a broad front of metal matrix composite production techniques so that the benefits of this new breed of engineering materials will be available to and utilized by European industry with significant advantages.

Production routes other than pressure casting are also being reviewed and a collation of current research on ceramic matrix composites will be made in the next phase of operation of the network.

A three-day symposium on Metal Matrix Composites is being organized by the Network 10 committee as part of the E-MRS Meeting in Strasbourg, May 29-June 1, 1990. Scheduled for May 29-31, the symposium will cover all aspects of MMCs and will be divided into five sessions:

- Manufacturing Techniques—liquid state and solid state processing, preform technology;
- Interfacial Phenomena—wetting, thermal stability, characterization;
- Mechanical Properties—static and dynamic testing, defect tolerance, NDE;
- Post Production Processing—forming, machining, joining; and
- Applications—components, service experience.

Authors should submit abstracts by March 31, 1990 to Prof. G.A. Chadwick, Engineering Materials, University of Southampton, Highfield, Southampton SO9 5NH, England. Full papers are due May 31, 1990 for publication in a conference proceedings.

A summer school on metal matrix composites is also being organized immediately prior to the symposium in the Strasbourg region during the May 25-28 weekend. Lectures given by members of Network 10 and other invited speakers will cover topics similar to those being addressed in the symposium. The intention is to encourage summer school attendees to participate in the symposium. Further details about the summer school can be obtained from Dr. K. Kainer, Materials Department, Clausthal University, Clausthal, West Germany.

Laboratories participating in this network are as follows: G.A. Chadwick, University of Southampton, Hi-Tec Metals R&D Ltd., United Kingdom; F. Kehoe, University of Southampton, United Kingdom and Ireland; M. Suery, Inst. Polytechnique de Grenoble, France; H. Nieswaag, Delft University of Technology, Netherlands; H. Fredriksson, Royal Institute of Technology, Sweden; L. Ekbom, National Defence Research Institute, Sweden; K. Kainer, Technische Universität, Clausthal, West Germany; K. Schulte, D.F.V.L.R, West Germany; H. Liholt, Risø National Laboratory, Denmark; L. Froyen, Katholieke Universiteit Leuven, Belgium; A. Delaey, Kathelieke Universiteit Leuven, Belgium. □

E-MRS Networks on Advanced Materials

Network Number	Theme	Group Leaders
1	Laser chemistry	I.W. Boyd (UK) 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.

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