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EUROPEAN CONFERENCE ON ADVANCED MATERIALS AND PROCESSES

NOVEMBER 22 - 24, 1989
AACHEN, FEDERAL REPUBLIC OF GERMANY

A CONFERENCE OF

f.e.m.s.

FEDERATION OF EUROPEAN MATERIALS SOCIETIES

EUROPEAN CONFERENCE ON ADVANCED MATERIALS AND PROCESSES

89

NOVEMBER 22 - 24, 1989
AACHEN, FEDERAL REPUBLIC OF GERMANY

A CONFERENCE OF
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FEDERATION OF EUROPEAN MATERIALS SOCIETIES

DGM
DEUTSCHE GESELLSCHAFT FÜR METALLKUNDE E.V.
Adenauerallee 21 · D-6370 Oberursel · Tel. (06171) 4081 · Fax (06171) 52554

Acknowledgements

The societies participating in f.e.m.s. would like to thank the sponsors:

Commission of the European Communities, Directorate-General for Science, Research and Development, Bruxelles;

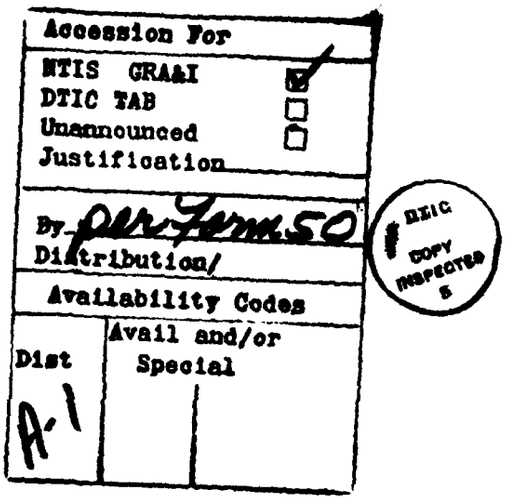
Deutsche Forschungsgemeinschaft, DFG, Bonn;

European Research Office of the United States Army, London;

Robert Bosch Stiftung GmbH, Stuttgart;

for financial support which made this event possible.

The organizing committee expresses its appreciation to all those who helped and who agreed to participate actively in the programme.



held its conference on November 22-24, 1989 at Aachen, Federal Republic of Germany. The following topics were discussed:

Contents

Keywords: West Germany. (JG)

f.e.m.s.

Federation of European Materials Societies

The aims of the Federation are to facilitate communication and the exchange of information between its members, to foster the wide dissemination of scientific, technical and related knowledge relevant to materials and to coordinate the activities of member organisations so as to achieve the most effective use of resources.

Any national or multinational society in Western Europe active in materials sciences and technology may apply to join the Federation.

MEMBERS

Austria
Verein Eisenhütte Österreich

Federal Republic of Germany
Deutsche Gesellschaft für Metallkunde
Deutscher Verband für Materialforschung und -prüfung

France
Société Française de Metallurgie

Italy
Associazione Italiana di Metallurgia

Portugal
Sociedade Portuguesa de Materiais

Spain
Centro Nacional de Investigaciones Metalurgicas

Sweden
Svenska Föreningen för Materialteknik

Switzerland
Schweizerischer Verband für die Materialtechnik

United Kingdom
Institute of Metals

Welcoming Address

At a time in which commercial and academic ties between the Western European states are becoming closer and stronger, the academic and technological societies of the individual countries are also playing a new and additional role. Dissemmination of new knowledge, cooperation in the solution of technological and academic problems and intensification of cross-border ties at a personal level will, in future, make an essential contribution to the overall commercial success of Europe.

The intention of the Federation of European Materials Societies (f.e.m.s.), in which the European materials oriented societies have joined forces, is to foster this cooperation. Following f.e.m.s. participation in several European conferences in recent years, at which in each case an individual, closely defined, technological or academic topic was discussed, EUROMAT '89 will treat the latest results from materials research and materials engineering in a more comprehensive way. EUROMAT '89 will thus become the first in a series of bi-annual f.e.m.s. meetings, at which European materials experts can present and discuss the latest results from research and engineering practice.

In the name both of the member institutions of f.e.m.s. and of this year's host society we extend a hearty welcome to all participants in EUROMAT '89. We are certain that this meeting will present an impressive picture of the capabilities of European industry, research institutes and universities. As well as the exchange of results, the clarification of hitherto unanswered questions and the stimulation of further work, an essential goal of EUROMAT '89 is to encourage personal contact between participants, the strengthening of existing ties and the establishment of new bonds. With this in mind, we wish you both an interesting time professionally and a rewarding stay personally in Aachen, which, as Germany's most westerly city with much charm and tradition, lies right at the heart of Europe.

M. Lallement
President
Federation of European Materials Societies

G. Petzow
President
Deutsche Gesellschaft für Metallkunde e. V.

Organizing Committee

Conference Chairman	H. E. Exner, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
Symposia Chairmen	P. Costa, Office National d'Etudes et de Recherches Aérospatiales, Châtillon (France)
	D. Driver, Rolls-Royce plc., Derby (UK)
	U. Köster, Universität Dortmund (FRG)
	J. Poirier, Commissariat a l'Energie Atomique, Paris (France)
	M. Sammet, IBM Deutschland GmbH, Sindelfingen (FRG)
	E. R. Wallach, University of Cambridge (UK)
Workshop Moderators	W. Kurz, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
	R. Stickler, Universität Wien (Austria)
Committee Members	N. Claussen, Technische Universität Hamburg-Harburg (FRG)
	M. Colombie, Institut de Recherches de la Sidérurgie Française, Saint-Germain-en-Laye (France)
	D. Dew-Hughes, University of Oxford (UK)
	P. Ehrhart, Kernforschungsanlage Jülich (FRG)
	D. G. Morris, Université de Neuchâtel (Switzerland)
	H. Mughrabi, Universität Erlangen-Nürnberg, Erlangen (FRG)
	L. Schultz, Siemens AG, Erlangen (FRG)
	R. Wagner, GKSS-Forschungszentrum Geesthacht GmbH, Geesthacht (FRG)
	J. G. Wurm, Commission of the European Communities, Bruxelles (Belgium)
Managing Chairman	V. Schumacher, Deutsche Gesellschaft für Metallkunde e.V., Oberursel (FRG)

Introduction

EUROMAT '89, the first European Conference on Advanced Materials and Processes, is being organized by Deutsche Gesellschaft für Metallkunde on behalf of the recently founded Federation of European Materials Societies (f.e.m.s.). It has been planned as a major event in the field, defining the state of the art in several selected topics. The present knowledge on these topics is reviewed in plenary sessions while detailed discussions take place in parallel oral sessions and in an extensive poster show. A plenary session and two parallel workshops give a resume of the results of the joint research work going on in the European Communities focussing on COST actions related to the symposia topics. An exhibition of products of manufacturers and service companies complements the scientific programme.

The selected topics are arranged in five symposia as follows:

Symposium A: Advanced Processing
Near Net Shape Processing with Optimized Microstructures via Forging, Casting and Powder Technology

Symposium B: Special Materials
High Temperature Materials (B I)
Biomaterials (B II)

Symposium C: High Technology Applications
Materials Science in Electronic Packaging and Device Technology

Symposium D: Basic Phenomena
Interface Reactions

Symposium E: Innovative Analysis Methods
Recent Developments in Microscopy (Scanning Tunneling, Force and Acoustic Microscopy)

Some of these topics are strongly interrelated. This is particulary true for symposia A and B and symposia C, D and E. Joint sessions of symposia C and D on Interfaces in Packaging are intended to avoid some of the conflict of interest which the conference participants may experience. In addition, the time schedule of the oral presentation has been designed such that it is easily possible to move from one symposium to another.

A significant part of the submitted papers are presented as posters in 23 topical groups.

Ample time to discuss posters has been provided during the breaks and at a special poster evening. The organizers hope that this arrangement will stimulate extensive discussions in fields related to the symposia topics as well as in other fields of current interest.

The COST plenary session and workshops are seen as a timely and logical opportunity to complement symposia A and B by displaying recent results to a broad audience. The success of the COST actions demonstrates how effective joint efforts in the European communities have been, in spite of language and other problems which may exist. The organizers anticipate a widening of interest and, in turn, promotion of joint research in the growing region covered by the materials societies of f.e.m.s.

Thus, the organizers hope that EUROMAT '89 will make a significant contribution to unification of European activities in the field of materials science and technology. A hearty welcome in Aachen to all participants on behalf of the organizing committee!

H. E. Exner
Conference Chairman

General Information

Conference Location

The European Conference on Advanced Materials and Processes will be held in the

Eurogress Aachen
Monheimsallee 52
D-5100 Aachen

The lectures of the various sections will be held in several lecture halls as indicated in the programme.

The poster presentations will be on display in the foyer of the congress center during the entire conference.

Conference Office

The conference office is located in the foyer of the congress center. Opening times of the conference office are:

Tuesday, November 21, 1989	15.00 h to 18.00 h
Wednesday, November 22, 1989	8.00 h to 18.00 h
Thursday, November 23, 1989	8.00 h to 12.30 h
	13.45 h to 18.00 h
Friday, November 24, 1989	8.00 h to 12.45 h
	13.30 h to 15.15 h

Conference Telephone

The conference office's telephone number is

0241/151018

during office hours.

Conference Language

The conference language will be English. No simultaneous translation will be provided.

Conference Secretariat/Registration

All those who wish to attend the conference should complete the enclosed **Registration Form** and return it to the conference secretariat:

Deutsche Gesellschaft für Metallkunde e. V.
Adenauerallee 21
D-6370 Oberursel
Federal Republic of Germany
Phone: 06171/4081
Telefax: 06171/52554

Deadlines

No deadline is given for conference registration. However, please note that an increased fee will be charged for payments received after October 30, 1989 and that hotel reservation should be completed before October 15, 1989 in order to guarantee accommodation in Aachen.

Exhibition

An exhibition of technical displays, scientific equipment, devices and literature will be held in connection with the conference. For further details contact the conference secretariat.

Registration Fee

The conference fees for the European Conference on Advanced Materials and Processes are as follows:

- Participants DM 820,–
  The fee includes:
  Attendance at the technical meetings, administrative cost, two selected volumes of the proceedings after the conference (the proceedings will consist of 3 volumes), extended abstracts, welcome reception, poster buffet, snack on Friday, refreshments during the official breaks.

- A limited number of registrations will be available on request at a reduced rate of DM 450,– **for colleagues** from universities until **October 15, 1989.**
  The fee includes:
  Attendance at the technical meetings, administrative cost, extended abstracts, welcome reception, poster buffet, snack on Friday, refreshments during official breaks. (This fee does not include the proceedings).

- A limited number of registrations will be available on request at a reduced rate of DM 225,– **for students** until **October 15, 1989.** The request must be signed by an authorized person of the respective university.
  The fee includes:
  Attendance at the technical meetings, administrative cost, extended abstracts, welcome reception, poster buffet, snack on Friday, refreshments during the official breaks. (This fee does not include the proceedings).

- Accompanying persons who are not interested in the scientific programme DM 40,–
  The fee includes:
  Administrative cost, welcome reception.

The fee for the conference banquet on Wednesday, November 22, 1989 is DM 60,–

Payment of the conference fee plus fees for accompanying persons and the conference banquet should be made upon mailing the Registration Form not later than October 30, 1989 in DM (Deutsch-Marks). Payment of the registration fee after this date will require an increase of 5%. Payment should be made by bank transfer to

Deutsche Gesellschaft für Metallkunde e. V.,
Adenauerallee 21, D-6370 Oberursel
Federal Republic of Germany

Banking account:

- Dresdner Bank, D-6370 Oberursel (FRG)
  Account-No 6 100 478 00
  Bank Sorting Code 500 800 00 (important)

For exceptional use only:

- Payment by cheque

Please include the delegate's name and the conference name "EUROMAT" on all money transfers.

Since the bank charge amounts to DM 10,–, we respectfully request participants from abroad to add this amount to the conference fee when making payment.

The fee for the conference banquet includes 14% V.A.T. The conference fee is free of V.A.T.

Delegates will receive confirmation and further information following receipt of the registration form and the conference fees.

After November 10, 1989, no further conference information material will be mailed, but will be handed over at the conference office in Aachen.

It is regretted that only a 75% refund can be made on cancellations up to November 10, 1989 and that no refunds can be made after this date.

Lists of participants, extended abstracts, information material and other documents will be available at the conference office in Aachen, which will be open during the entire conference (times given on page 8).

Conference Proceedings

Proceedings of the European Conference on Advanced Materials and Processes (3 volumes, approx. 2000 pages) will be published after the Conference. The delegates may select 2 of 3 volumes of the proceedings. These are included in the conference fee of DM 820,–.

Accommodation

Verkehrsverein Bad Aachen e. V.
Monheimsallee 52
Postfach 2007
D-5100 Aachen
Phone: 0241-1802950 and 0241-1802951

has been appointed the official agent for hotel reservations. Please use the enclosed **booking form for hotel reservations.**

Delegates will receive confirmation of hotel reservations directly from the "Verkehrsverein Bad Aachen".

Hotel reservations should be made **before October 15, 1989.**

Participants are requested to notify any changes or cancellations of room reservations to the hotel directly.

Insurance

Deutsche Gesellschaft für Metallkunde as organizer of the conference cannot accept responsibility for personal accident or loss of or damage to the private property of participants and accompanying persons which may occur either during, or arising from the conference. Participants should, therefore, take whatever steps they consider necessary regarding insurance.

Restaurants

There are a number of restaurants in the town including that in the conference building where participants may take lunch. No special arrangements for lunch will be made on Wednesday and Thursday. There will be a quick lunch on Friday which is included in the fee.

Transport facilities

No transport to the congress center will be necessary as it is easily accessible by foot from all hotels.

Car Parking

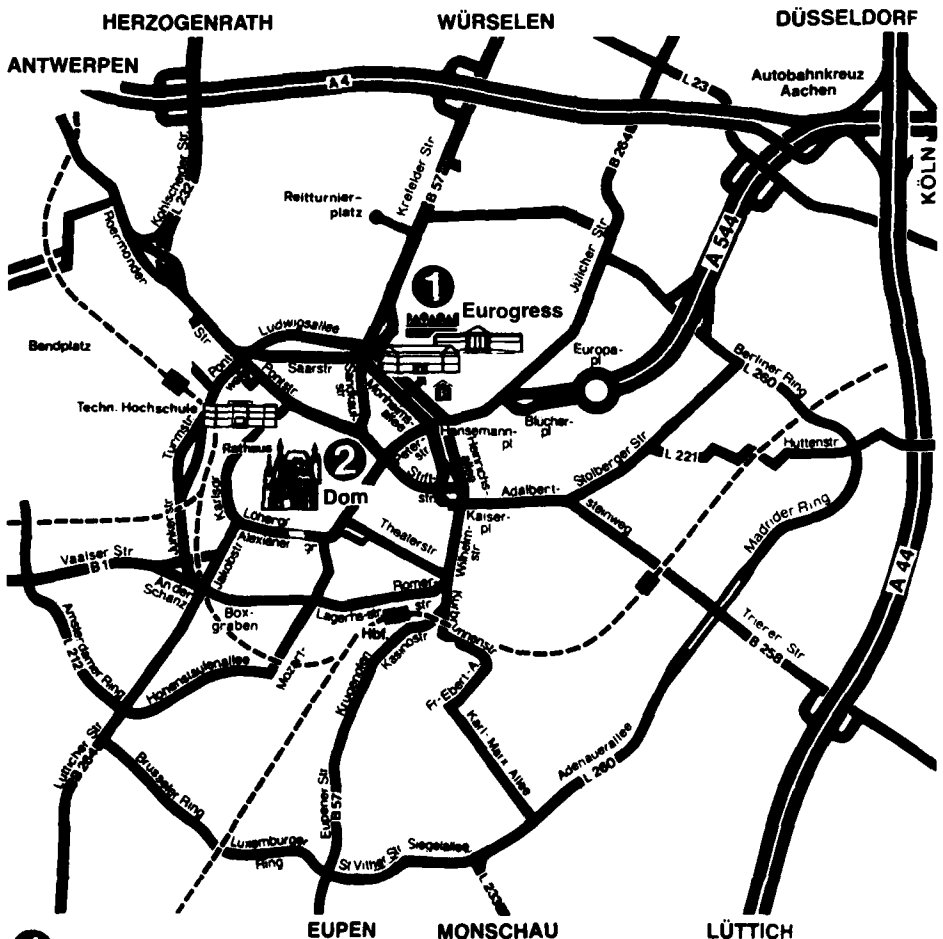
Car parking space will be available at the Eurogress (payment of the parking fee is required).

Travel to Aachen

Aachen can be reached:

by car: via Autobahn 4 from Köln Airport
via Autobahn 44 from Düsseldorf Airport
via Autobahn A 76 from Antwerpen and Maastricht
via Autobahn A 3 from Brüssel, Lüttich . . .

by air: two major airports – Köln/Bonn and Düsseldorf – are on the doorstep to Aachen. By train it takes 1.30 h to get from the airport Köln/Bonn or Düsseldorf to Aachen.



1 Eurogress Aachen

2 Rathaus Aachen, Krönungssaal

Social Events

Tuesday, November 21

Welcoming Reception

Eurogress

Welcome to the Federal Republic of Germany and to Aachen! You are cordially invited to attend a reception in the foyer of the conference center Eurogress where you can renew old acquaintances and make new friends from industry and the universities.

Beginning at: 18.30 h

End: 20.00 h (approx.)

No booking required.

Wednesday, November 22

Conference Banquet

Coronation Hall in Aachen Town Hall

At the beginning of the 14th century the citizens of Aachen took charge of the decaying palace building and built the Gothic town hall on the very same foundations. The citizens of Aachen committed themselves to providing it with a hall for the Crowning Meal. Charles IV was the first to hold a Crowning Meal after his coronation in 1349.

An evening to remember in the rich setting of the city's medieval charms.

Beginning at: 20.00 h

End: 23.00 h

Booking required.

Thursday, November 23

Poster Evening

Eurogress

On Thursday, November 23, 1989, 18.30 h a buffet will be served in the foyer of the Europa Saal (where the posters are on display). The price for the buffet is included in the conference fee and beverages will be served until 22.00 h. Authors of posters are asked to be present from 18.30 to 22.00 h.

OPENING SESSION

Chairmen:

C. Beernaert, President, Société Française de Métallurgie (France)
Sir Geoffrey Ford, General Secretary, Federation of European Materials Societies (UK)

9.00 **Welcome Addresses**

- P. M. Fasella, Directeur General, Commission of the European Communities, Directorate-General for Science, Research and Development, Bruxelles (Belgium)
- R. Lallement, President, Federation of European Materials Societies (France)
- G. Petzow, President, Deutsche Gesellschaft für Metallkunde e. V. (FRG)

9.20 **Introductory Paper**

Y. Farge, PECHINEY, Paris (France)

Which Materials will be Successful in the Future?

PLENARY SESSION 1

Chairmen:

T. Ericsson, President, Svenska Föreningen för Materialteknik (Sweden)
G. Petzow, President, Deutsche Gesellschaft für Metallkunde (FRG)

10.00 W. Bonfield, Queen Mary College, London (UK)

Biomaterials for Bones and Joint Replacement

10.40 BREAK

PLENARY SESSION 2

Chairmen:

J. Leupp, Schweizerischer Verband für die Materialtechnik (Switzerland)
Sir Robert Scholey, President, Institute of Metals (UK)

11.20 G. W. Meetham, Rolls-Royce plc., Derby (UK)

High Temperature Materials – The Overall View

12.00 B. C. Johnson, E. I. Du Pont de Nemours and Co., Wilmington (USA)

Trends in High Performance Integrated Circuit Packaging

12.40 LUNCH

14.00 Near Net Shape Processing (I): Forging, page 17
High Temperature Materials (I): Superalloys, page 23
Biomaterials, page 29
Materials Science in Electronic Packaging and Device Technology (I): Ceramic Packaging, page 31

PLENARY SESSION 3

Chairmen:

P. N. Hansen, Dansk Metallurgisk Selskap (Denmark)
H. Hiebler, President, Verein Eisenhütte Österreich (Austria)

9.00 U. Gösele, Duke University, Durham (USA)
Kinetic and Thermodynamic Instabilities in Thin Film Reactions

9.40 G. Ertl, Fritz Haber Institut der Max Planck Gesellschaft, Berlin (FRG)
Microsccpy of Surfaces

10.20 BREAK

11.00 Near Net Shape Processing (II): Casting, page 19
High Temperature Materials (I): Superalloys, page 25
Interfaces in Packaging (I): Thin Film Packaging and Polymer/Metal Interfaces, page 35
Recent Developments in Microscopy (I): Scanning Tunneling and Force Microscopy, page 40

PLENARY SESSION 4

Joint Efforts in European Materials Science and Technology

Chairmen:

H. E. Exner, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
J. G. Wurm, Commission of the European Communities, Bruxelles (Belgium)

9.00 A. Gracia-Arroyo, Commission of the European Communities, Bruxelles (Belgium)
Opportunities for Materials Research in EC Funded Programmes

9.20 T. B. Gibbons, National Physical Laboratory, Teddington (UK)
COST 501: A Concerted European Action in the Field of SUPERALLOYS

9.40 R. Stickler, University Wien (Austria)
COST 503: A Concerted European Action in the Field of POWDER METALLURGY

10.00 W. Kurz, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
COST 504: A Concerted European Action in the Field of CASTING TECHNOLOGY

10.20 BREAK

11.00 Workshop 1: COST 503 "Powder Metallurgy", page 15
Workshop 2: COST 504 "Advanced Casting and Solidification Technology", page 16
Materials Science in Electronic Packaging and Device Technology (II): Materials, Trends and Processing in Advanced Packaging, page 33
Interface Reactions, page 38

Workshop 1: COST 503 "Powder Metallurgy"

11.00–12.40

Moderator:

R. Stickler, Universität Wien (Austria)

Group 1: Powder Metallurgy of Light Metals and Alloys

Introduction by the Coordinator M. J. Couper (Switzerland)

M. J. Couper (Switzerland), R. Schäfer (FRG), G.R.D. Shrimpton (UK), B. Weiss (Sp) (Austria)

Fatigue and Fracture of Advanced PM-Al Alloys

M. J. Couper (Sp) (Switzerland), M. Hohman (FRG), P. Schwellinger (Switzerland), S. Savage (Sweden)

Processing and Properties of Rapidly Solidified Al Alloys

Group 2: Powder Metallurgy of Hard Materials

Introduction by the Coordinators H. Ortner, K. Weiss (Austria)

Review Presentation: H. Ortner (Austria)

The Influence of Trace Impurities on Technology and Properties of Hard Materials

Project Collaborators: G. Friedbacher (Austria), M. Grasserbauer (Austria), E. Kübel (FRG), A. Kirvesniemi (Finland), B. Lux (Austria), H. Manninen (Finland), W.-D. Schubert (Austria), H. Tulhoff (FRG), B. Uhrenius (Sweden), P. Wilhartitz (Austria)

Group 3: Powder Metallurgy of Fe-Based Alloys

Introduction by the Coordinator W. Paton (UK)

D. Pohl (Sp) (FRG), O. Kohlbacher (Austria)

Development of Powder Metallurgical Roller Bearings for Large Constructions

K. Lipp (FRG), R. Lawcock (UK), K. Richter (FRG), G. Schlieper (FRG), C. Sonsino (Sp) (FRG), J. Tengzelius (Sweden)

Development of Connecting Rods from Sintering Steels for Car Engines

12.40 LUNCH

13.45 Near Net Shape Processing (III): Powder Technology, page 22
High Temperature Materials (III): Composites and Ceramics, page 28
Materials Science in Electronic Packaging and Device Technology (II): Materials, Trends and Processing in Advanced Packaging, page 34
Interface Reactions, page 39

Affiliation refers to speaker (Sp).

Workshop 2: COST 504 "Advanced Casting and Solidification Technology"

11.00–12.40

Moderator:

W. Kurz, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

W. Schäfer (Sp), F. Hediger, J. C. Sturm, RWTH Aachen (FRG)

Numerical Modelling of Heat Transfer at Interfaces: Finite Element Approaches Testing and Examples

F. Syvertsen, SINTEF, Trondheim (Norwegen)

Simulation of Moldfilling and Temperature Distribution in a Casting

A. Roósz (Sp), H. E. Exner, Technical University for Heavy Industry, Miskolc (Hungary)

Phase Stability Diagram of a Ternary Aluminium Alloy System

M. Rappaz (Sp), J. D. Richoz, P. Thévoz, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Modelling of Solidification of Nodular Cast Iron

F. Mampaey, WTCM Gieterijcentrum, Zwijnaarde (Belgium)

Modelling of Cast Iron Microstructure

J. Lacaze (Sp), G. Lesoult, Ecole des Mines, Nancy (France)

Nucleation of Graphite Particles in Grey and S. G. Cast Irons

E. Lundbäck (Sp), I. L. Svensson, The Royal Institute of Technology, Stockholm (Sweden)

Computer Simulations of Structure and Mechanical Properties of Nodular Cast Iron

12.40 LUNCH

13.45 Near Net Shape Processing (III): Powder Technology, page 22
High Temperature Materials (III): Composites and Ceramics, page 28
Materials Science in Electronic Packaging and Device Technology (II): Materials, Trends and Processing in Advanced Packaging, page 34
Interface Reactions, page 39

Affiliation refers to speaker (Sp).

SYMPOSIUM A: Advanced Processing

Near Net Shape Processing (I): Forging

Session 1

Chairmen:

D. Driver, Rolls-Royce plc., Derby (UK)
M. Rappaz, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Opening by Symposium Chairman.

14.00 **Keynote**
R. W. Evans, University College of Swansea (UK)
Microstructural Modelling in Near Net Shape Forging
Discussion

14.40 G. W. Kuhlman (Sp), A. K. Chakrabarti, D. A. Beabout, K. D. Armanie, D. A. Lukasak, R. Pishko, Alcoa Forging Division, Cleveland (USA)
Critical Aspects of Thermomechanical Processing in Al/Ti Precision Forging Manufacture
Discussion

15.00 A. Vassel (Sp), J. F. Uginet, M. H. Campagnac, ONERA, Châtillon (France)
Improved Microstructure and Properties of Ti-10V-2Fe-3Al Titanium Alloy through Isothermal Forging
Discussion

15.20 J. W. Brooks, INCO Engineered Products Ltd., Birmingham (UK)
The Application of Finite Element Modelling to Isothermal Forging
Discussion

15.40 BREAK

16.10 Near Net Shape Processing (I): Forging, page 18
High Temperature Materials (I): Superalloys, page 24
Biomaterials, page 30
Materials Science in Electronic Packaging and Device Technology (I): Ceramic Packaging, page 32

Affiliation refers to speaker (Sp).

Near Net Shape Processing (I): Forging

Session 2

Chairmen:

D. Dew-Hughes, University of Oxford (UK)
H. W. Grünling, Asea Brown Boveri AG, Mannheim (FRG)

16.10 P. P. Schepp, Sulzer AG, Winterthur (Switzerland)
Isothermal Forging: Forming Close to Final Shape with Demanding Materials and Complex Geometries
Discussion

16.30 B. O. Oyekanmi (Sp), T. A. Hughes, A. N. Bramley, National Metallurgical Research and Development Centre, Jos (Nigeria)
Application of Recrystallization Behaviour in Quantification of Deformation
Discussion

16.50 M. Lamberigts (Sp), E. Diderrich, L. Mosy, Centre de Recherches Métallurgiques, Liège (Belgium)
Mandrelless Rotary Forging: Theoretical Modelling and Experiments
Discussion

17.10 A. Tietmann (Sp), K. Baldner, R. Kopp, RWTH Aachen (FRG)
Squeeze Forging: A Near Net Shape Technique for High Strength Applications
Discussion

17.30 M. Horihata (Sp), K. Ohuchi, T. Sano, Mechanical Engineering Laboratory, Tsukuba, Ibaraki (Japan)
High Temperature Properties of Die Materials for Isothermal Forging
Discussion

17.50 L. Jílek (Sp), L. Jelen, Vítkovice, Ostrava (CSSR)
Large Forgings for Nuclear Power Generating Equipment
Discussion

18.10 END

20.00 Conference Banquet, page 12

Affiliation refers to speaker (Sp).

Near Net Shape Processing (II): Casting

Session 1

Chairmen:
T. W. Clyne, University of Cambridge (UK)
P. R. Sahm, Rhein.-Westf.-Techn. Hochschule Aachen (FRG)

11.00 **Keynote**
A. W. D. Hills, *Sheffield (UK)*
Microstructural Engineering of Near Net Shape Casting
Discussion

11.40 C. Liesner, Titan-Aluminium-Feinguß GmbH, Bestwig (FRG)
Light Metal Investment Casting
Discussion

12.00 T. Mizoguchi (Sp), K.-I. Miyazawa, Nippon Steel Corporation, Kawasaki (Japan)
Formation of Solidification Structure in a Twin-Roll Rapid Solidification Process
Discussion

12.20 J. Beuers (Sp), E. Lange, J. Haußelt, Degussa AG, Hanau (FRG)
Metal Injection Moulding – Microstructural Design by Enhanced Sintering Technique
Discussion

12.40 LUNCH

14.00 Near Net Shape Processing (II): Casting, page 20
High Temperature Materials (II): Steels, page 26
Recent Developments in Microscopy (I): Scanning Tunneling and Force Microscopy, page 41

14.20 Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 36

Affiliation refers to speaker (Sp).

Near Net Shape Processing (II): Casting
Session 2

Chairmen:
E. Blank, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
M. Blazy, C 3 F-Airforge, Paris (France)

14.00 B. L. Mordike (Sp), K. U. Kainer, J. Schröder, Technische Universität Clausthal, Clausthal-Zellerfeld (FRG)
Short Fibre Reinforced Magnesium Alloys Produced by Squeeze Infiltration
Discussion

14.20 P. Bárczy, Technical University for Heavy Industry, Miskolc (Hungary)
Directionally Solidified Al-Ni(Me) Eutectics
Discussion

14.40 S. Patel (Sp), I. C. Elliott, Inco Alloys Ltd., Hereford (UK)
Advanced Melting Techniques for Superalloys
Discussion

15.00 F. Durand, Grenoble Polytechnic Institute, Saint Martin d'Heres (France)
Castability Test: Modelling and Related Experiments
Discussion

15.20 P. Kapranos (Sp), D. H. Kirkwood, C. M. Sellars, University of Sheffield (UK)
The Microstructure of Thixotropic Alloy Slurries
Discussion

15.40 BREAK

16.10 Near Net Shape Processing (III): Powder Technology, page 21
High Temperature Materials (III): Composites and Ceramics, page 27
Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 37
Recent Developments in Microscopy (II): Acoustic Scanning Microscopy, page 42

Affiliation refers to speaker (Sp).

Near Net Shape Processing (III): Powder Technology

Session 1

Chairmen:
W. A. Kaysser, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
P. P. Schepp, Sulzer AG, Winterthur (Switzerland)

16.10 **Keynote**
E. Bachelet, SNECMA, Evry (France)
Microstructural Development in Powder Technology
Discussion

16.50 H. Grazzini (Sp), P. Lasne, C. Levaillant, Ecole des Mines de Paris, Valbonne (France)
Powder Metallurgy Preform Design for Powder Forging: A Physical Simulation Method Using a Model Material
Discussion

17.10 J. Zhou (Sp), J. Duszczyk, Laboratory for Materials Science, Delft (The Netherlands)
Microstructural Features of the Extruded Al-20Si-3Cu-1Mg Alloy Prepared from Rapidly Solidified Powder
Discussion

17.30 S. Hodiamont (Sp), W. Bunk, Deutsche Forschungsanstalt für Luft- und Raumfahrt, Köln (FRG)
Effect of the Consolidation Method on the Microstructure of PM/RS Aluminium Alloys
Discussion

17.50 M. Jeandin (Sp), F. Barbalat, C. Blain, T. C. Lu, P. Luquet, Ecole Nationale Supérieure des Mines de Paris, Evry (France)
Study of Plasma-Sprayed Graded W-Cu Composites Using Glow Discharge Spectrometry Compared to Quantitative Image and Electron Probe Analyses
Discussion

18.10 END

18.30 Poster Evening, page 12 and page 43

Affiliation refers to speraker (Sp).

Near Net Shape Processing (III): Powder Technology
Session 2

Chairmen:
F. Jeglitsch, Montanuniversität Leoben (Austria)
D. G. Morris, Université Neuchâtel (Switzerland)

13.45 W. Kahl (Sp), J. Leupp, Swiss Aluminium Ltd., Neuhausen (Switzerland)
Spray Deposition of High Performance Aluminium Alloys Via the Osprey Process
Discussion

14.05 M. Igharo (Sp), T. Kirby, J. V. Wood, The Open University, Milton Keynes (UK)
Development of High Speed Steels Produced by the Osprey Process
Discussion

14.25 A. Leatham (Sp), P. F. Chesney, R. Pratt, D. Zebrowski, Osprey Metals Ltd., Neath (UK)
The Osprey Process – A Versatile Manufacturing Technology for the Production of Solid and Hollow Rounds and Clad (Compound) Billets
Discussion

14.45 T. W. Clyne (Sp), P. A. Dearnley, K. A. Roberts, University of Cambridge (UK)
In-Flight Phenomena During Vacuum Plasma Co-Spraying of Titanium-Based Composites
Discussion

15.05 END

Affiliation refers to speaker (Sp).

SYMPOSIUM B I: Special Materials

High Temperature Materials (I): Superalloys

Session 1

Chairmen:

P. Costa, Office National d'Etudes et de Recherches Aérospatiales, Châtillon (France)
H. Mughrabi, Universität Erlangen-Nürnberg, Erlangen (FRG)

Opening by Symposium Chairman.

14.00 **Keynote**

T. B. Gibbons, National Physical Laboratory, Teddington (UK)

The Superalloys: Present Status and Future Prospects

Discussion

14.40 J. Hammer (Sp), H. Mughrabi, Universität Erlangen-Nürnberg, Erlangen (FRG)

High Temperature Creep and Microstructure of the Monocrystalline Nickel Base Superalloy SRR 99

Discussion

15.00 T. Khan (Sp), P. Caron, ONERA, Châtillon (France)

The Anisotropy of Mechanical Behaviour in Nickel-Based Single Crystal Superalloys for Turbine Blades

Discussion

15.20 F. Schubert (Sp), H. J. Penkalla, A. Weisbrodt, Kernforschungsanlage Jülich GmbH, Jülich (FRG)

PHASCALC: An Improved Computer Programme for the Calculation of Phase Kinetics, Microstructural Parameters and Microstructural Instabilities in Nickel-Base Superalloys

Discussion

15.40 BREAK

16.10 High Temperature Materials (I): Superalloys, page 24
Near Net Shape Processing (I): Forging, page 18
Biomaterials, page 30
Materials Science in Electronic Packaging and Device Technology (I): Ceramic Packaging, page 32

Affiliation refers to speaker (Sp).

High Temperature Materials (I): Superalloys

Session 2

Chairmen:

D. Coutsouradis, Centre de Recherches Metallurgique, Liège (Belgium)
R. Wagner, GKSS-Forschungszentrum Geesthacht GmbH (FRG)

16.10 G. Scheunemann-Frerker (Sp), M. Feller-Kniepmeier, Technische Universität Berlin (FRG)

On the Choice of APB Planes in the γ'-Phase of Nickel Based Superalloys with High Volume Fractions of γ'

Discussion

16.30 P. Veyssière (Sp), N. Clément, D. Caillard, ONERA, Châtillon (France)

The Fine Structures of Dislocations and Their Mobility in Ordered Intermetallic Alloys

Discussion

16.50 D. Blavette (Sp), A. Buchon, S. Chambreland, Laboratoire de Microscopie Ionique, Mont Saint Aignan (France)

Influence of Heat Treatments on Phase Composition and Fine Scale Features of Some Ni Base Superalloys: A FIM Atom-Probe Investigation

Discussion

17.10 J.-L. Strudel (Sp), A. Fredholm, *Ecole Nationale Supérieure* des Mines de Paris, Evry (France)

Creep Resistance, γ' Shape Changes and Dislocation Structures in Nickel Base Single Crystals

Discussion

17.30 A. Marucco (Sp), E. Lang, V. Lupinc, Consiglio Nazionale Delle Ricerche, Cinisello Balsamo (Italy)

The Effect of Thermomechanical Treatments on Short Range Ordering and Carbide Precipitation in a Ni-Cr Based Superalloy

Discussion

17.50 E. E. Affeldt (Sp), G. W. König, MTU Motoren- und Turbinen-Union München GmbH, München (FRG)

Effect of Time and Temperature on Crack Propagation in a Nickel Base Superalloy (Udimet 700)

Discussion

18.10 END

20.00 Conference Banquet, page 12

Affiliation refers to speaker (Sp).

High Temperature Materials (I): Superalloys
Session 3

Chairmen:
T. Khan, ONERA, Châtillon (France)
K. Schneider, Asea Brown Boveri AG, Mannheim (FRG)

11.00 H. Bernard (Sp), L. Remy, Ecole des Mines de Paris, Evry (France)
Thermal-Mechanical Fatigue of an Aluminide Coated Nickel Base Superalloy
Discussion

11.20 R. P. Wahi (Sp), M. D. Mathew, V. Singh, W. Chen, Hahn-Meitner-Institut Berlin GmbH, Berlin (FRG)
Effect of Hold Time on the Low Cycle Fatigue Behaviour of Nimonic PE 16
Discussion

11.40 T. Baumgärtner (Sp), K. Bothe, W. M. Laanemäe, V. Gerold, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
Thermomechanical Fatigue of Nimonic 80A
Discussion

12.00 R. D. Townsend, Central Electricity Research Laboratories, Leatherhead (UK)
Steels for High Temperature Applications
Discussion

12.20 C. Leymonie (Sp), G. Thauvin, A. Coulon, GEC Alsthom, Belfort (France)
Some 12% Cr Steels Developed for Fossile Steam Turbine HP and MP Parts
Discussion

12.40 LUNCH

14.00 High Temperature Materials (II): Steels, page 26
Near Net Shape Processing (II): Casting, page 20
Recent Developments in Microscopy (I): Scanning Tunneling and Force Microscopy, page 41

14.20 Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 36

Affiliation refers to speaker (Sp).

High Temperature Materials (II): Steels

Chairmen:
T. B. Gibbons, National Physical Laboratory, Teddington (UK)
G. Pomey, Société Française de Métallurgie, Paris (France)

14.00 **Keynote**
G. Kalwa, Mannesmann Forschungsinstitut, Duisburg (FRG)
Steels for High Temperature Applications
Discussion

14.40 P. P. Schepp (Sp), U. Heisel, T. Hollstein, K. Torssell, Sulzer AG, Winterthur (Switzerland)
Powdermetallurgical Fabrication of Steam Line Components from Advanced 9–12% Cr Steels
Discussion

15.00 E. Tolksdorf (Sp), K. Schneider, J. Schubert, B. Trück, VGB Technische Vereinigung der Großkraftwerksbetreiber e. V., Essen (FRG)
The Influence of Precipitated Carbides on Toughness Properties of X 20 CrMoV 12 1
Discussion

15.20 M. H. Van de Voorde, Joint Research Centre Petten Establishment, Petten (The Netherlands)
High Temperature Materials in Fossile Fuel Conversion Technology
Discussion

15.40 BREAK

16.10 High Temperature Materials (III): Composites and Ceramics, page 27
Near Net Shape Processing (III): Powder Technology, page 21
Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 37
Recent Developments in Microscopy (II): Acoustic Scanning Microscopy, page 42

Affiliation refers to speaker (Sp).

High Temperature Materials (III): Composites and Ceramics

Session 1

Chairmen:
P. Boch, ESPCI, Paris (France)
R. Brook, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)

16.10 **Keynote**
J. F. Jamet, Aerospatiale, Saint-Medard-en-Jalles (France)
State of the Art and Future Prospects for High Temperature Composites
Discussion

16.50 G. Navarre (Sp), G. Fantozzi, D. Rouby, Institut National des Sciences Appliquées, Villeurbanne (France)
Fracture Behaviour of Ceramic-Ceramic Composites and Related Toughening Mechanisms
Discussion

17.10 M. Rühle (Sp), G. H. Campbell, A. G. Evans, University of California, Santa Barbara (USA)
Microstructure and Mechanical Properties of Ceramic Composites
Discussion

17.40 K.-H. Zum Gahr, Kernforschungszentrum Karlsruhe (FRG)
Tribological Properties of Engineering Ceramics
Discussion

18.10 END

18.30 Poster Evening, page 12 and page 43

Affiliation refers to speaker (Sp).

High Temperature Materials (III): Composites and Ceramics
Session 2

Chairmen:
N. Claussen, Technische Universität Hamburg-Harburg (FRG)
G. Ziegler, Deutsche Forschungsanstalt für Luft- und Raumfahrt e.V., Köln (FRG)

13.45 A. Mocellin, Ecole des Mines, Nancy (France)
Some Recent Developments on Superplasticity of Ceramics
Discussion

14.05 P. R. Boch, ENSCI, Limoges (France)
Resistance of Ceramics to Thermal Shocks
Discussion

14.25 M. Seibold (Sp), P. Greil, Technische Universität Hamburg-Harburg (FRG)
Composite Ceramics from Polymer-Metal Mixtures
Discussion

14.45 H. Schmidt, Fraunhofer-Institut für Silicatforschung, Würzburg (FRG)
Sol-Gel Derived Ceramics
Discussion

15.05 END

Affiliation refers to speaker (Sp).

SYMPOSIUM B II: Special Materials

Biomaterials

Session 1

Chairmen:
W. Bonfield, Queen Mary College, London (UK)
J. Poirier, Commissariat à l'Energie Atomique, Paris (France)

Opening by Symposium Chairman.

14.00 **Keynote**
R. Ranc (Sp), D. Maziere, Centre d'Etudes Nucléaires de Grenoble (France)
Carbons for Biomedical Applications
Discussion

14.40 J. Geis-Gerstorfer (Sp), E. H. Greener, Universität Tübingen (FRG)
Effect of Mo-Content and pH on Pitting Corrosion of Ni-Cr-Mo Dental Alloys
Discussion

15.00 W. V. Youdelis, University of Windsor (Canada)
Indium in Dispersed Phase Amalgam: Effect on Properties and Mercury Vapor Release
Discussion

15.20 P. Poyet (Sp), P. Guiraldenq, UNIREC, Firminy (France)
Study of Metal-Ceramic Interface for Dental Applications
Discussion

15.40 BREAK

16.10 Biomaterials, page 30
Near Net Shape Processing (I): Forging, page 18
High Temperature Materials (I): Superalloys, page 24
Materials Science in Electronic Packaging and Device Technology (I): Ceramic Packaging, page 32

Affiliation refers to speaker (Sp).

Biomaterials
Session 2

Chairmen:
J. F. Rieu, Ecole Nationale Supérieure des Mines, Saint-Etienne (France)
W. V. Youdelis, University of Windsor (Canada)

16.10 C. Mattheck (Sp), S. Burkhardt, D. Erb, K. Schubert, Kernforschungszentrum Karlsruhe GmbH, Karlsruhe (FRG)
A New Fatigue Resistant Prothesis Surface
Discussion

16.30 A. Pichat (Sp), L. M. Rabbe, J. Rieu, C. Chabrol, R. Leveque, G. Bousquet, A. Rambert, Ecole Nationale Supérieure des Mines, Saint-Etienne (France)
Effect of Ionic Implantation on Titanium Alloy-Polyethylene Friction Couple in Joint Protheses
Discussion

16.50 U. Gennari, Metallwerk Plansee GmbH, Reutte (Austria)
Optimization of ODS-Niobium for Load-Bearing Implants with Excellent Biocompatibility
Discussion

17.10 B. Gibbesch (Sp), G. Elssner, G. Petzow, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
Mechanical and Chemical Properties of Ti/Al_2O_3 Joints for Dental Implants
Discussion

17.30 H. Carrerot (Sp), J. Rieu, G. Bousquet, A. Rambert, Ecole Nationale Supérieure des Mines, Saint-Etienne (France)
Ceramic Plasma Spray Coatings on Metallic Joint Protheses
Discussion

17.50 J. Lemaitre (Sp), A. A. Mirtchi, E. Munting, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
Microstructure and Strength Development in Calcium Phosphate Biocements
Discussion

18.10 END

20.00 Conference Banquet, page 12

Affiliation refers to speaker (Sp).

SYMPOSIUM C: High Technology Applications

Materials Science in Electronic Packaging and Device Technology (I): Ceramic Packaging

Session 1

Chairmen:
P. Coeure, Centre d'Etudes Nucléaires de Grenoble (France)
M. Sammet, IBM Deutschland GmbH, Sindelfingen (FRG)

Opening by Symposium Chairman.

14.00 **Keynote**
R. Tummala, IBM Yorktown, Hopewell Junction (USA)
Ceramics in Microelectronics
Discussion

14.40 D. Holland (Sp), E. Logan, Warwick University, Coventry (UK)
Glass-Ceramics in High Performance Microelectronic Packages
Discussion

15.00 P. Foley (Sp), G. Wingefeld, F. Aldinger, Hoechst AG, Frankfurt (FRG)
Ceramic Filled Glass Composites for Multilayer Substrates
Discussion

15.20 R. Monteiro (Sp), J. Kunesch, A. Frisch, W. A. Kaysser, Universidade Nova de Lisboa, Monte de Caparica (Portugal)
Hiping of Alumina-Glass Systems
Discussion

15.40 BREAK

16.10 Materials Science in Electronic Packaging and Device Technology (I): Ceramic Packaging, page 32
Near Net Shape Processing (I): Forging, page 18
High Temperature Materials (I): Superalloys, page 24
Biomaterials, page 30

Affiliation refers to speaker (Sp).

Materials Science in Electronic Packaging and Device Technology (I): Ceramic Packaging
Session 2

Chairmen:
E. Bischoff, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
A. Roosen, Hoechst AG, Frankfurt (FRG)

16.10 R. Brückner (Sp), H. Hegeler, C. Reich, Technische Universität Berlin (FRG)
Fundamentals and Development of Fibre Reinforced Glasses and Glass Ceramics
Discussion

16.30 V. Gunay, University of Sheffield (UK)
Fibre Reinforced Glass and Glass-Ceramics by the Sol-Gel Process
Discussion

16.50 S. Nazaré (Sp), R. Heidinger, Kernforschungszentrum Karlsruhe (FRG)
Sintering Studies of AlN for the Improvement of Dielectric Properties at Microwave Frequencies
Discussion

17.10 W. Mader (Sp), D. Schwabe, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
Fabrication and Characterization of Low-Energy Metal/AlN Interfaces
Discussion

17.30 R. Queriaud (Sp), P. Lefort, M. Billy, University of Limoges (France)
Compatibility Between Tungsten and Aluminium Nitride: Influence of a Calcium Oxide Additive
Discussion

17.50 A. Kranzmann (Sp), G. Petzow, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
Influence of Sinter Additives on the Thermal Conductivity of Pressureless Sintered Aluminium Nitride
Discussion

18.10 END

20.00 Conference Banquet, page 12

Affiliation refers to speaker (Sp).

Materials Science in Electronic Packaging and Device Technology (II): Materials, Trends and Processing in Advanced Packaging

Session 1

Chairmen:
H. Reichl, Technische Universität Berlin (FRG)
K. Roeser, Siemens AG, München (FRG)

11.00 S. Roth, Max-Planck-Institut für Festkörperforschung, Stuttgart (FRG)
Charge Transport in Conductive Polymers – Physical Principles and Applications
Discussion

11.40 H. E. Hoenig, Siemens AG, Erlangen (FRG)
High T_c-Superconductors for Packaging
Discussion

12.20 J. Margail (Sp), C. Jaussaud, M. Bruel, A. M. Papon, Centre d'Etudes Nucléaires de Grenoble (France)
Silicon on Insulator for Microelectronic Devices
Discussion

12.40 LUNCH

13.45 Materials Science in Electronic Packaging and Device Technology (II): Materials, Trends and Processing in Advanced Packaging, page 34
Near Net Shape Procesing (III): Powder Technology, page 22
High Temperature Materials (III): Composites and Ceramics, page 28
Interface Reactions, page 39

Affiliation refers to speaker (Sp).

Materials Science in Electronic Packaging and Device Technology (II): Materials, Trends and Processing in Advanced Packaging

Session 2

Chairmen:

H. L. Hartnagel, Technische Hochschule Darmstadt (FRG)
R. Tummala, IBM East Fishkill, Hopewell Junction (USA)

13.45 H. Hieber, CEM, Neumünster (FRG)
Microjoining Techniques
Discussion

14.25 A. Million (Sp), J. Piaguet, T. Colin, L. Di Ciocio, Centre d'Etudes Nucléaires de Grenoble (France)
Molecular Beam Epitaxy of HgCdTe Compounds
Discussion

14.45 A. J. Oster, IBM Deutschland, Sindelfingen (FRG)
IBM Large System Packaging Evolution
Discussion

15.05 END

Affiliation refers to speaker (Sp).

JOINT SYMPOSIUM C + D:
High Technology Applications/Basic Phenomena

Interfaces in Packaging (I): Thin Film Packaging and Polymer/Metal Interfaces

Chairmen:
G. Elsner. IBM Deutschland GmbH, Sindelfingen (FRG)
J. Petermann, Technische Universität Hamburg-Harburg (FRG)

Opening by Symposium Chairmen.

11.00 **Keynote**
M. Grunze, Universität Heidelberg (FRG)
Applications and Properties of Polyimides in Microelectronic Devices
Discussion

11.40 F. Faupel (Sp), D. Gupta, B. D. Silverman, P. S. Ho, Universität Göttingen (FRG)
Tracer Diffusion of Ag and Cu in Polyimide
Discussion

12.00 T. Hoffmann (Sp), J. Petermann, Technische Universität Hamburg-Harburg (FRG)
Epitaxy of Metals on Polymer Substrates
Discussion

12.20 M. Stratmann, Max-Planck-Institut für Eisenforschung, Düsseldorf (FRG)
Stability and Reactivity of Chemically Modified Iron Surfaces
Discussion

12.40 P. Pagés (Sp), A. Andrés, Universidad Politécnica de Cataluña, Terrassa (Spain)
Fourier Transform Infrared Characterization of the Glass Matrix Interface
Discussion

13.00 LUNCH

14.00 Near Net Shape Processing (II): Casting, page 20
High Temperature Materials (II): Steels, page 26
Recent Developments in Microscopy (I): Scanning Tunneling and Force Microscopy, page 41

14.20 Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 36

Affiliation refers to speaker (Sp).

Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging

Session 1

Chairmen:

D. Holland, University of Warwick, Coventry (UK)
L. Schultz, Siemens AG, Erlangen (FRG)

14.20 M. Rühle (Sp), A. G. Evans, University of California, Santa Barbara (USA)
Structure, Chemistry and Fracture Resistance of Metal/Ceramic Interfaces
Discussion

14.40 B. Gibbesch (Sp), G. Elssner, H. F. Fischmeister, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
Ultra High Vacuum Bonded Metal/Sapphire Joints
Discussion

15.00 B. Ralph (Sp), P. L. Flaitz, V. Randle, The University of West London, Uxbridge (UK)
Bonding of MgO to Copper Containing Dilute Alloy Additions
Discussion

15.20 R. Schmid-Fetzer, Technische Universität Clausthal, Clausthal-Zellerfeld (FRG)
Stability of Metals and Intermetallics on GaAs
Discussion

15.40 BREAK

16.10 Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 37
Near Net Shape Processing (III): Powder Technology, page 21
High Temperature Materials (III): Composites and Ceramics, page 27
Recent Developments in Microscopy (II): Acoustic Scanning Microscopy, page 42

Affiliation refers to speaker (Sp).

Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging
Session 2

Chairmen:
P. Ehrhart, Kernforschungsanlage Jülich (FRG)
W. M. Stobbs, University of Cambridge (UK)

16.10 J. Kivilahti (Sp), J. Öini, M. Paulasto, S. Pienimaa, Helsinki University of Technology, Espoo (Finland)
Effects of Brazing Parameters on the Microstructures and Thermal Fatigue Behaviour of the AlN/Cu Joints Produced by an Activated Ag-Cu Filler Material
Discussion

16.30 F. Hong (Sp), D. Holland, University of Warwick, Coventry (UK)
Glass-Ceramic Coatings on High Temperature Alloys
Discussion

16.50 W. Weise (Sp), H. Krappitz, W. Malikowski, Degussa AG, Hanau (FRG)
Active Metal Brazing of Silicon Nitride
Discussion

17.10 L. J. Bostelaar (Sp), M. T. J. Verhees, *Philips Research Laboratories Eindhoven* (The Netherlands)
The Metallization of AlN by a W-Containing Paste
Discussion

17.30 R. Leucht (Sp), H.-J. Dudek, G. Ziegler, Deutsche Forschungsanstalt für Luft- und Raumfahrt, Köln (FRG)
Thermal Stability of SiC-Fibre Reinforced Ti6Al4V-Alloys
Discussion

17.50 G. Neite (Sp), H.-J. Dudek, W. Bunk, K. H. Matucha, Metallgesellschaft AG, Frankfurt (FRG)
Fibre-Matrix Interface in Cast Al_2O_3-Aluminium Alloy Composites
Discussion

18.10 END

18.30 Poster Evening, page 12 and page 43

Affiliation refers to speaker (Sp).

SYMPOSIUM D: Basic Phenomena

Interface Reactions

Session 1

Chairmen:
G. Beranger, Université de Technologie de Compiegne (France)
U. Köster, Universität Dortmund (FRG)

Opening by Symposium Chairman.

11.00 **Keynote**
W. M. Stobbs, University of Cambridge (UK)
New TEM Techniques for the Characterisation of a Boundary
Discussion

11.40 B. Ralph, The University of West London, Uxbridge (UK)
Grain Boundary Engineering
Discussion

12.00 J. Philibert, Université de Paris-Sud, Orsay (France)
Reactive Diffusion
Discussion

12.20 M. Pajunen (Sp), J. Kivilahti, J. Miettinen, Helsinki University of Technology, Espoo (Finland)
Thermodynamic and Kinetic Consideration of the Ti-Si Diffusion Couple
Discussion

12.40 LUNCH

13.45 Interface Reactions, page 39
Near Net Shape Processing (III): Powder Technology, page 22
High Temperature Materials (III): Composites and Ceramics, page 28
Materials Science in Electronic Packaging and Device Technology (II): Materials, Trends and Processing in Advanced Packaging, page 34

Affiliation refers to speaker (Sp).

Interface Reactions
Session 2

Chairmen:
A. L. Greer, University of Cambridge (UK)
K. Urban, Kernforschungsanlage Jülich (FRG)

13.45 J. Eckert (Sp), L. Schultz, K. Urban, Siemens AG, Erlangen (FRG)
Interfacial Reactions and Amorphous Phase Formation in Ni-Zr Composite Wires
Discussion

14.05 K. Samwer (Sp), H. Schröder, S. Eickert, A. Regenbrecht, S. Schneider, B. Schuhmacher, U. Köster, Universität Augsburg (FRG)
Phase Sequence in the Solid State Amorphization Reaction of Metallic Thin Films
Discussion

14.25 M.-H. Ambroise, Régie Nationale des Usines Renault, Boulogne Billancourt (France)
Some Aspects of Metal-Metal Bonding
Discussion

14.45 H. J. Boving (Sp), H. E. Hintermann, Centre Suisse d'Electronique et de Microtechnique S. A., Neuchâtel (Switzerland)
Advanced Technology Titanium Carbide Coated Bearings
Discussion

15.05 END

Affiliation refers to speaker (Sp).

SYMPOSIUM E: Innovative Analysis Methods

Recent Developments in Microscopy (I): Scanning Tunneling and Force Microscopy

Session 1

Chairmen:

G. Ertl, Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin (FRG)
E. R. Wallach, University of Cambridge (UK)

Opening by Symposium Chairman.

11.00 **Keynote**

J. K. Gimzewski, IBM Zürich Research Laboratory, Rüschlikon (Switzerland)

Local Experiments with the Scanning Tunneling Microscope

Discussion

11.40 H. G. Vehoff (Sp), M. Müller, P. Neumann, Max-Planck-Institut für Eisenforschung, Düsseldorf (FRG)

A Scanning Tunneling Microscope for the Examination of Local Material Faults

Discussion

12.00 F. Besenbacher (Sp), E. Lægsgaard, I. Stensgaard, University of Aarhus (Denmark)

A Fully Automated "Thimble Size" Scanning Tunneling Microscope

Discussion

12.20 D. Lawunmi (Sp), M. C. Payne, Cavendish Laboratory, Cambridge (UK)

Theoretical Study of Scanning Tunneling Microscope Images of Graphite

Discussion

12.40 LUNCH

14.00 Recent Developments in Microscopy (I): Scanning Tunneling and Force Microscopy, page 41
Near Net Shape Processing (II): Casting, page 20
High Temperature Materials (II): Steels, page 26

14.20 Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 36

Affiliation refers to speaker (Sp).

Recent Developments in Microscopy (I): Scanning Tunneling and Force Microscopy
Session 2

Chairmen:
G. A. D. Briggs, University of Cambridge (UK)
P. Neumann, Max-Planck-Institut für Eisenforschung GmbH, Düsseldorf (FRG)

14.00 **Keynote**
M. E. Welland, University of Cambridge (UK)
Scanning Tunneling Microscopy of Macromolecules
Discussion

14.40 H. Heinzelmann (Sp), E. Meyer, H. Rudin, H.-J. Güntherodt, Universität Basel (Switzerland)
Force Microscopy in Materials Science
Discussion

15.00 M. Pitsch (Sp), O. Metz, J. Strnad, H.-H. Kohler, Universität Regensburg (FRG)
Construction of an Atomic Force Microscope and Application in Surface Chemistry
Discussion

15.20 G. Bachmann (Sp), W. Berthold, H. Oechsner, Universität Kaiserslautern (FRG)
Work Function Raster Microscopy
Discussion

15.40 BREAK

16.10 Recent Developments in Microscopy (II): Acoustic Scanning Microscopy, page 42
Near Net Shape Processing (III): Powder Technology, page 21
High Temperature Materials (III): Composites and Ceramics, page 27
Interfaces in Packaging (II): Metal/Ceramic Interfaces and Packaging, page 37

Affiliation refers to speaker (Sp).

Recent Developments in Microscopy (II): Acoustic Scanning Microscopy

Chairmen:
H. Vetters, Institut für Werkstofftechnik, Bremen (FRG)
M. E. Welland, University of Cambridge (UK)

16.10 **Keynote**
G. A. D. Briggs, University of Oxford (UK)
How Sensitive is Acoustic Microscopy?
Discussion

16.50 E. Matthaei (Sp), H. Vetters, P. Mayr, Stiftung Institut für Werkstofftechnik, Bremen (FRG)
Reflective Scanning Acoustic Microscopy for Imaging Sub-Surface Structures in Solid State Materials
Discussion

17.10 A. Kulik (Sp), G. Gremaud, S. Sathish, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
Direct Measurements of the SAW Velocity and Attenuation Using Continuous Wave Reflection Scanning Acoustic Microscope
Discussion

17.30 U. Beller (Sp), H.-A. Crostack, H.-D. Steffens, K. Reichel, Universität Dortmund (FRG)
Use of Scanning Acoustic Microscopy to Characterize Cathodic Arc Deposited CrN Films
Discussion

17.50 S. Boseck (Sp), G. Heygster, H. Block, Universität Bremen (FRG)
Investigations on the Defocussing Effects in a SAM at Straight Amplitude and Phase Edges
Discussion

18.10 END

18.30 Poster Evening, page 12 and page 43

Affiliation refers to speaker (Sp).

POSTER PRESENTATIONS

Some of the papers proposed for presentation during EUROMAT '89 will be displayed as posters during the entire conference. Extended coffee breaks between the oral sessions and a poster evening will provide an opportunity to discuss the papers with authors. Special times for individual discussions and contacts between authors and interested conference participants can be arranged by the conference secretariat on request.

The Poster Show will be displayed in the foyer in front of the Europa Saal
from

Wednesday, November 22, 9.00 h

to

Friday, November 24, 15.00 h

The main event of the Poster Show will be a Poster Evening in the foyer where the posters are displayed,

on Thursday, November 23
at 18.30 h (open ended).

A buffet dinner will be served (price included in the conference fee for all participants) and beverages will be available until 22.00 h.

A map on which the poster groups can be located is available at the secretariat desk.

Poster Group I.

Melt Refining, Casting Technology and Cast Iron

I. 1 D. Hartmann (Sp), U. Mürrle, M. Krehl, Degussa AG, Hanau (FRG)
Electron Beam Melting and Refining of Superalloys

I. 2 S. Chakravorty (Sp), M. S. Peck, P. N. Quested, National Physical Laboratory, Teddington (UK)
Cleanliness Evaluation of a Nickel-Base Superalloy: the Effects of Process Control During Electron Beam Button Melting

I. 3 N. Eruslu (Sp), A. Altmışoğlu, Istanbul Technical University (Turkey)
The Effect of Alloying Elements Cu, Fe, Mg on the Eutectic Morphology of Unidirectional Solidification of Zn- 4% Al Alloys

I. 4 N. Eruslu (Sp), A. Altmışoğlu, Istanbul Technical University (Turkey)
The Grain Refinement of Al-Cu-Zn Alloys by Low Frequency Vibration

I. 5 H. Manninen (Sp), K. Lilius, J. Virolainen, Helsinki University of Technology, Espoo (Finland)
Binder Removal: The Effect of Binder Components

I. 6 M. Ienciu (Sp), V. Brabie, P. Moldovan, L. Cristea, G. Neagu, Institul Politehnic Bucuresti (Romania)
Studies on the Interface Reactions in the Refining of Metallic Melts by Filtration

I. 7 N. Eruslu (Sp), A. Altmışoğlu, Istanbul Technical University (Turkey)
The Properties of Sodium Aluminate Bonded Silica Cores

I. 8 I. Katavić, University "V. Bakarić", Rijeka (Yugoslavia)
The Properties of a New Chromium White Iron in the As-Cast State

I. 9 S. Pietrowski, Technical University, Lodz (Poland)
Hypereutectoid Cast Steel with Nodular Graphite and Bainite/Martensite Structure

I. 10 K. Herfurth (Sp), G. Engels, E. Möllmann, Verein Deutscher Gießereifachleute, Düsseldorf (FRG)
Development of Properties and Areas of Application of Graphitic Cast Irons

Affiliation refers to speaker (Sp).

Poster Group II.

Preparation and Processing of Powders

II. 1 P. Le Brun (Sp), L. Froyen, B. Munar, L. Delaey, Katholieke Universiteit Leuven, Heverlee (Belgium)
Mechanical Alloying of Al-Fe Powders

II. 2 D. Parlapanski (Sp), S. Denev, E. Gatev, Higher Mining-Geological Institute, Sofia (Bulgaria)
Mechanical Activation and Mechanical Alloying of Metallic Systems

II. 3 D. Stock (Sp), P. R. Sahm, P. N. Hansen, RWTH Aachen (FRG)
Characteristics of Very Fine Metal Powders Produced by a Two-Step Atomization Technique

II. 4 C. Delaunay (Sp), D. Locq, A. Walder, ONERA, Châtillon (France)
New Gas Atomisation Nozzles for Ultrafine Metal Powders

II. 5 G. Matei (Sp), E. Bicsak, Institutul Politehnic, Cluj-Napoca (Romania)
The Morphology and the Structure of Hollow Powders Obtained by the Water Atomization of Some Nickel Alloys

II. 6 R. Naß (Sp), H. Schmidt, Fraunhofer-Institut für Silicatforschung, Würzburg (FRG)
Electrophoresis: an Alternative Forming Technique for Submicron Ceramic Powders

II. 7 M. A. López-Quintela (Sp), J. Rivas, J. Quibén, Universidad de Santiago de Compostela (Spain)
Preparation of Ultrafine Nd-Fe-B Magnetic Particles by Chemical Reduction in Microemulsions

II. 8 G. Gusmano (Sp), P. Ñunziante, E. Traversa, R. Montanari, F. Tarli, G. Chiozzini, Universita' Degli Studi di Roma "Tor Vergata" (Italy)
Preparation of Mixed Mg-Fe Hydroxides for Mg-Fe Spinel Formation

II. 9 J. Schmiedl (Sp), E. Dudrová, F. Molnár, Technical University Košice (CSSR)
Electrochemical Alloying of Nickel and Copper to Prepare Fe-Ni-Cu Powder Metallurgical Systems

Affiliation refers to speaker (Sp).

Poster Group III.

Surface Treatments and Laser Processing

III. 1 K. Wendland (Sp), R. Prümmer, Fraunhofer-Institut für Werkstoffmechanik, Freiburg (FRG)
Surface Thermomechanical Treatment (STMT) as a Means to Improve the Service Behaviour of Materials

III. 2 G. K. Wolf (Sp), M. Barth, W. Ensinger, A. Schröer, Universität Heidelberg (FRG)
Modification of Interface Properties by Ion Beam Techniques

III. 3 A. R. Tarakcilar, Dokuz Eylul University, Denizli (Turkey)
The Effect of Hardening Depth on Fatigue Strength in Notched Carburizing Steel

III. 4 A. Ç. Can, Dokuz Eylul University, Denizli (Turkey)
The Effect of High Temperature (1050° C) Carburizing on Fatigue Strength

III. 5 K. S. Petkov (Sp), G. M. Mladenov, A. A. Kot, S. N. Doroshenko, Technological Centre for Electron Beam and Plasma Technologies and Technique, Sofia (Bulgaria)
Magnetic-Impulse Processing of Deposits with Changeable Properties and Thickness

III. 6 V. Zábavník, Vysoká škola technická – Ústav výpočtovej techniky, Košice (CSSR)
Influence of Si on the Kinetics of Nitriding Layer Growth

III. 7 M. Carrard (Sp), M. Gremaud, M. Zimmermann, W. Kurz, Ecole Polytéchnique Fédéral de Lausanne (Switzerland)
A Novel Microstructure in Rapidly Solidified Al Alloys

III. 8 M. Naeem (Sp), M. Preston, J. Tyrer, University of Technology, Loughborough (UK)
Processing of Ceramic Materials with High Power CO_2 Lasers

III. 9 M. Preston (Sp), M. Naeem, J. Tyrer, University of Technology, Loughborough (UK)
Laser Machining of Ceramic Materials with High Power CO_2 Lasers

III. 10 I. Minkoff (Sp), A. Mehlmann, A. Zur, Israel Institute of Technology, Haifa (Israel)
Laser Interactions with Surfaces and Technological Applications

Affiliation refers to speaker (Sp).

Poster Group IV.

Fundamental Aspects of Superalloys

IV. 1 U. Glatzel (Sp), M. Feller-Kniepmeier, Technische Universität Berlin (FRG)
Application of a Finite Element Model to the Microstructure of a Nickel Based Superalloy with High Volume Fraction of γ'-Phase

IV. 2 W. Mitter (Sp), G. Wiedner, F. Wimmer, E. T. Till, Böhler GmbH, Kapfenberg (Austria)
Temperature and Stress Field During Cooling of a Gas Turbine Blade after Forging

IV. 3 B. Sitaud (Sp), X. Zhang, C. Dimitrov, O. Dimitrov, Centre National de la Recherché Scientifique – Centre d'Etudes de Chimie Metallurgique, Vitry-sur-Seine (France)
Self-Diffusion and Kinetics of Atomic Ordering in the γ and γ'Phases of Nickel Based Model Superalloys

IV. 4 A. Marty (Sp), M. Bessiere, Y. Calvayrac, S. Le Febvre, Centre National de la Recherché Scientifique – Centre d'Etudes de Chimie Metallurgique, Vitry-sur-Seine (France)
Determination of Long Range Order in Ni-Base Ternary Alloys by X-Ray Anomalous Diffraction Using Synchrotron Radiation

IV. 5 C. Dimitrov (Sp), X. Zhang, B. Sitaud, O. Dimitrov, U. Dedek, F. Dworschak, Centre National de la Recherché Scientifique – Centre d'Etudes de Chimie Metallurgique, Vitry-sur-Seine (France)
Composition Dependence of the Properties of Irradiation Induced Defects in γ Ni (Al), γ Ni (Al,Ti) and γ' Ni_3Al Alloys

IV. 6 N. Njah (Sp), A. Chamberod, V. Naundorf, O. Dimitrov, Centre National de la Recherché Scientifique – Centre d'Etudes de Chimie Metallurgique, Vitry-sur-Seine (France)
***The Effects of* Low-Dose Irradiation on the Mechanical Properties of NiAlTi Model Superalloys**

Affiliation refers to speaker (Sp).

Poster Group V.

Single Crystal Superalloys

V. 1 P. Caron (Sp), T. Khan, ONERA, Châtillon (France)
Development of a New Nickel Based Single Crystal Turbine Blade Alloy for Very High Temperatures

V. 2 H.-J. Klam (Sp), E. W. Blank, Ecole Polytéchnique Fédérale de Lausanne (Switzerland)
The Growth of Modern Superalloy Single Crystals

V. 3 J. Lacaze (Sp), D. Bellet, N. Siredey, J. P. Michel, A. George, P. Bastie, Ecole des Mines, Nancy (France)
"Crystalline Quality" of Directionally Solidified Single Grains of a Nickel-Based Superalloy

V. 4 A. Coujou (Sp), P. Lours, B. de Mauduit, Université Paul Sabatier, Toulouse (France)
High Temperature Stress-Induced Spreading of Stacking Faults in the γ' Phase of the CMSX2 Superalloy

V. 5 E. W. Blank (Sp), H.-J. Klam, Ecole Polytéchnique Fédérale de Lausanne (Switzerland)
Creep Anisotropy of Single Crystalline Superalloys

V. 6 T. Grosdidier (Sp), A. Hazotte, A. Simon, Ecole des Mines, Nancy (France)
Chemical Segregation and Chemical Processes in Single Crystal Nickel-Based Superalloys

V. 7 A. Hazotte (Sp), T. Grosdidier, A. Simon, Ecole des Mines, Nancy (France)
Coarsening Kinetics and Morphological Changes of the γ'Phase in a Single Crystal Nickel-Based Superalloys

Affiliation refers to speaker (Sp).

Poster Groupe VI.

Microstructure and Properties of Superalloys

VI. 1 H.-A. Kuhn (Sp), U. Siebert, H. G. Sockel, Universität Erlangen-Nürnberg, Erlangen (FRG)
Elastic Properties and Microstructure of Nickel-Based Superalloys at High Temperature

VI. 2 U. Siebert (Sp), H. G. Sockel, Universität Erlangen-Nürnberg, Erlangen (FRG)
Measured and Calculated Elastic Properties of Directionally Solidified Ni-Based Superalloys

VI. 3 R. P. Wahi (Sp), M. Sundararaman, V. Singh, W. Chen, Hahn-Meitner-Institut Berlin GmbH, Berlin (FRG)
Temperature Dependence of Stress Response and Microstructural Evolution in Nimonic PE16 under Low Cycle Fatigue Loading

VI. 4 M. Rödig (Sp), M. Pfaffelhuber, F. Schubert, H. Nickel, Kernforschungsanlage Jülich (FRG)
Examination of Creep-Fatigue Crack Growth in Alloy 800 at 700° C

VI. 5 M. Spaniol (Sp), K. Schreck, KHD Luftfahrttechnik GmbH, Oberursel (FRG)
Improvement of the Static and Dynamic Strength Characteristics of Nickel-Based Cast Alloys

VI. 6 R. P. H. Fleming, Thames Polytechnic, London (UK)
The Structure and Properties of New High Strength Nickel-Based Alloys

VI. 7 E. Tekin, Middle East Technical University, Ankara (Turkey)
Microstructural Characteristics of an Ethylene Cracking Pipe

VI. 8 P. von den Brincken (Sp), P. Busse, P. R. Sahm, Aachener Centrum für Erstarrung unter Schwerelosigkeit e. V., Aachen (FRG)
Metal-Ceramic-Composites for High Temperature Applications

Affiliation refers to speaker (Sp).

Poster Groupe VII.

Heat Resistant and High Strength Steels

VII. 1 F. Groisböck (Sp), R. Ebner, F. Jeglitsch, Montanuniversität Leoben (Austria)
Creep Behaviour of a Heat Resistant Ferritic Chromium Steel

VII. 2 T. Prnka (Sp), Z. Bembenek, V. Foldyna, The Iron and Steel Research Institute, Dobra (CSSR)
Microalloyed Steels for High Temperature Service

VII. 3 J. Chodorowski (Sp), J. Wasiak, A. Balul, Warsaw University of Technology (Poland)
Structural Degradation and Its Effect on the Mechanical Properties of 15HM(Cr-Mo) Steel

VII. 4 H. Cerjak (Sp), B. Buchmayr, H. P. Fauland, University of Technology Graz (Austria)
The Effect of Precipitation Behaviour on the HAZ-Properties of 1% Cr-Mo-V Steel

VII. 5 H.-J. Christ (Sp), F. Petry, H. Mughrabi, Universität Erlangen-Nürnberg, Erlangen (FRG)
Isothermal and Thermomechanical Fatigue Behaviour of the Austenitic Stainless Steel 304 L Between Room Temperature and 650° C in High Vacuum

VII. 6 R. H. Kozłowski, Cracow Technical University (Poland)
Creep Fracture in Stabilized Austenitic Stainless Steels

VII. 7 A. Hollý (Sp), P. Veles, East Slovakia Iron Works, Košice (CSSR)
Relation Between Fracture Toughness and Structural Parameters of High-Strength Microalloyed Steel

Affiliation refers to speaker (Sp).

Poster Group VIII.

High Temperature Intermetallics

VIII. 1 M. Dahms, GKSS-Forschungszentrum, Geesthacht (FRG)
Production of Intermetallic Phases by Solid State Reaction of Cold Extruded Elemental Powders

VIII. 2 M. Strangwood (Sp), R. James, C. A. Hippsley, Harwell Laboratory, Didcot (UK)
Grain Boundary Precipitation in Ni_3Al Based Alloys

VIII. 3 J. Bonneville (Sp), N. Baluc, J. L. Martin, Ecole Polytechnique Fédérale de Lausanne (Switzerland)
On the Anomalous Temperature Dependence of the Mechanical Strength of Ni_3Al

VIII. 4 L. Singheiser (Sp), H. W. Grünling, Asea Brown Boveri AG, Mannheim (FRG)
Oxidation and Hot Corrosion Behaviour of Intermetallics

VIII. 5 A. Baldan, DMST, CSIR, Pretoria (South Africa)
Electron Microprobe Investigation of Lower Melting Regions in the As-Cast Structure of a DS 200 + Hf Single Crystal

Affiliation refers to speaker (Sp).

Poster Group IX.

Phase Diagrams for High Temperature Materials

IX. 1 J. Golczewski (Sp), M. Bamberger, S. Dirnfeld, E. Gozlan, J. Klodt, B. Prinz, H. L. Lukas, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
Phase Diagrams of the Ni-Fe-Mo and Ni-Cr-Mo Ternary Systems – Experiments and Thermodynamic Calculations as a Basis for Superalloy Development

IX. 2 M. Durand-Charre (Sp), D. David, P. Willemin, Institut National Polytechnique de Grenoble, St. Martin d'Hères (France)
Pseudo Ternary Systems as Models to Explain the Metallurgical Structure of Superalloys

IX. 3 L. B. Hussain Al-Yasiri, University of Technology, Baghdad (Irak)
Microscopic Structural Study of the NiCrAl Ternary System

IX. 4 V. Ojha (Sp), J. Drapala, M. K. Bhargava, L. Kuchar, CSIR, New Delhi (India)
Study of the Distribution Coefficient of Tungsten in Tantalum

Affiliation refers to speaker (Sp).

Poster Group X.

High Temperature Corrosion and Oxidation

X. 1 J. Jedlinski, Technische Universität Clausthal, Clausthal-Zellerfeld (FRG)
The Beneficial Effect of Reactive Elements on the Oxidation Behaviour of Alumina-Forming Materials at High Temperature – A Review

X. 2 K. Fritscher (Sp), Y. T. Lee, Deutsche Forschungsanstalt für Luft- und Raumfahrt, Köln (FRG)
Effect of Differently Processed NiCoCrAlY Coatings on Microstructure and on Hot Corrosion Resistance

X. 3 G. Borchardt (Sp), J. Jedlinski, S. Mrowec, Technische Universität Clausthal, Clausthal-Zellerfeld (FRG)
The Effect of Reactive Elements on the High-Temperature Oxidation Behaviour of Ferritic FeCrAl Alloys

X. 4 K. Kokkinoplitis (Sp), P. Christodoulou, MIRTEC S. A., Volos (Greece)
A Model to Predict the Oxidizing-Carburizing Resistance of Austenitic Stainless Steels as a Function of Alloy Chemistry

X. 5 W. Storch (Sp), H. Roggendorf, H. Schmidt, M. Hastenrath, Fraunhofer-Institut für Silicatforschung, Würzburg (FRG)
Study of Insulation Layer Formation on Electrical Steel Surfaces by X-Ray Photoelectron Spectroscopy and Electron Microprobe Analysis

X. 6 K. Fritscher (Sp), H.-J. Rätzer-Scheibe, Deutsche Forschungsanstalt für Luft- und Raumfahrt, Köln (FRG)
Burner Rig Tests of EB-PVC Coatings on DSE γ/γ'-α

X. 7 A. Walder (Sp), D. Locq, C. Delaunay, ONERA, Châtillon (France)
New Metallic Felts with Improved Resistance to High Temperature Oxidation

Affiliation refers to speaker (Sp).

Poster Group XI.

Ceramics and Non-Metal Composites

XI. 1 R. Hamminger (Sp), C. Boberski, F. Aldinger, Hoechst AG, Frankfurt (FRG)
Microstructural Aspects of the Processing of Sintered SiC and Si_3N_4

XI. 2 G. A. Schneider (Sp), G. Andrees, R. Danzer, C. Rief, A. Wanner, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
Physical Properties and Fracture Mechanics of Pressureless Sintered SiC

XI. 3 M.-L. Vesanen (Sp), P. Järvelä, Tampere University of Technology (Finland)
Injection Moulding of Alumina

XI. 4 M. Hubáček (Sp), B. Řehák, The Iron and Steel Research Institute, Karlštejn (CSSR)
Hot Pressing of Hexagonal Boron Nitride

XI. 5 R. Elsing (Sp), O. Knotek, U. Balting, RWTH Aachen (FRG)
Simulation Models for Studying Properties of Composite Materials Manufactured by Thermal Spraying Processes using Ceramic Powders

XI. 6 W. Huettner (Sp), R. Weiss, Schunk Kohlenstofftechnik GmbH, Gießen (FRG)
Oxidation Inhibited Carbon/Carbon: a Candidate Material for Hot Structures

XI. 7 E. Proverbio (Sp), F. Carassiti, R. Cigna, E. Fazio, Universita' Degli Studi di Roma "La Sapienza" (Italy)
Preparation and Testing of Ceramic Probes (SnO_2 and Cr_2O_3) for the Measurement of Al_2O_3 Concentration in Electrolytic Aluminium Cells

XI. 8 F. Castro (Sp), I. Iturriza, J. Echeberria, Centro de Estudios e Investigaciones Tecnicas de Guipuzcoa, San Sebastian (Spain)
Glass Powder Encapsulation and Hiping of Silicon Nitride Ceramics

Affiliation refers to speaker (Sp).

Poster Group XII.

High Temperature Superconductors

XII. 1 M. Muhammed (Sp), K. V. Rao, Y. Zhang, The Royal Institute of Technology, Stockholm (Sweden)
Computer Based Modelling and Solution Processing of Powder Materials

XII. 2 M. Calamiotou (Sp), N. Guskos, T. Leventouri, V. Perdikatsis, University of Athens (Greece)
High Temperature Superconductor Bi-Sr-Ca-Cu-O with T_c=80K

XII. 3 Y. Ivanova (Sp), Y. Dimitriev, B. Samuneva, E. Gattev, V. Michailova, A. Staneva, Higher Institute of Chemical Technology, Sofia (Bulgaria)
Glass-Ceramic and Ceramic Materials in the Bi-Ca-Sr-Cu-O and Bi-Ca-Sr-Cu-Pb-O Systems

XII. 4 E. Kashchieva (Sp), Y. Dimitriev, Y. Pirov, D. Lepkova, E. Gatev, V. Dimitrov, S. Djambazov, Higher Institute of Chemical Technology, Sofia (Bulgaria)
Microstructure and Phase Formation of Ceramic Material in the Nd-Ba-Cu-Ag-O System

Affiliation refers to speaker (Sp).

Poster Group XIII.

Light Alloys and Light Metal Matrix Composites

XIII. 1 M. A. Däubler (Sp), M. T. Cope, MTU Motoren- und Turbinen-Union München GmbH, München (FRG)
Influence of Heat Treatment on Microstructure and Properties of an Advanced High-Temperature Titanium Alloy

XIII. 2 G. Cam (Sp), H. M. Flower, D. R. F. West, Imperial College, London (UK)
Phase Transformations in Ti-Al-C Alloys

XIII. 3 T. P. Johnson (Sp), J. W. Brooks, M. H. Loretto, University of Birmingham (UK)
The Preparation of Ti-Based Metal Matrix Composites Via a Casting Route

XIII. 4 G. Avramović-Cingara (Sp), H. J. McQueen, G. L'Esperance, Faculty of Technical Science, Novi Sad (Yugoslavia)
Substructure Developed in the Hot Working of Al-Li Alloys

XIII. 5 A. A. Mazhar (Sp), Q. R. Ali, A. Q. Khan, Dr. A. Q. Khan Research Laboratories, Rawalpindi (Pakistan)
Effect of Casting Parameters and Heat Treatment on the Properties of an Investment Cast Al-7Si-4Cu Alloy Component

XIII. 6 M. Strangwood (Sp), N. J. Taylor, C. A. Hippsley, Harwell Laboratory, Didcot (UK)
The Effect of the Matrix-Reinforcement Interface on the Ageing Response of an Aluminium 6061 Alloy Reinforced with 20 vol % SiC Particulates

XIII. 7 M. Hubert-Protopopescu (Sp), H. Hubert, Max-Planck-Institut für Metallforschung, Stuttgart (FRG) – External Fellow-Worker
High-Strength Wrought Al-Zn-Mg-Cu Alloys for Aeronautical Applications

XIII. 8 K. U. Kainer, Technische Universität Clausthal, Clausthal-Zellerfeld (FRG)
Properties of Consolidated Magnesium Alloy Powder

Affiliation refers to speaker (Sp).

Poster Group XIV.

Rapidly Solidified and Amorphous Metals

XIV. 1 J. Szablewski (Sp), B. Kuźnicka, Technical University of Wrocław (Poland)
Electrical Properties of Rapidly Solidified Cu-Cr Alloys

XIV. 2 W. Zaprianova (Sp), R. Raicheff, E. Kashieva, V. Dimitrov, Higher Institute of Chemical Technology, Sofia (Bulgaria)
Effect of Thermally Induced Structural Changes on the Corrosion Behaviour of Amorphous $Co_{70,3}Fe_{4,7}Si_{15}B_{10}$ Alloys

XIV. 3 E. Gatev (Sp), D. Parlapanski, Higher Institute of Chemical Technology, Sofia (Bulgaria)
Interatomic Pair Potentials for Amorphous Metallic Alloys

XIV. 4 M. Petrescu (Sp), N. Petrescu, M. Isac, V. Oltean, M. Călin, C. Sandor, Polytechnic Institute of Bucharest (Romania)
Selection and Characterization of Some Amorphous Ferromagnetic Alloys

Affiliation refers to speaker (Sp).

Poster Group XV.

Shape Memory Alloys

XV. 1 S. Tan (Sp), H. Xu, I. Müller, Technische Universität Berlin (FRG)
All-Round Shape Memory Effect and Its Physical Simulation Model

XV. 2 S. Tan (Sp), H. Xu, S. N. Roy, K. H. Kim, B. Hinz, I. Müller, Technische Universität Berlin (FRG)
The Thermomechanical Behaviour and Microstructure of Cu-Al-Ni Single Crystals with Shape Memory

XV. 3 S. N. Roy (Sp), S. Tan, H. Xu, K. H. Kim, B. Hinz, I. Müller, Technische Universität Berlin (FRG)
Growth of CuZnAl and CuAlNi Single Crystals with Shape Memory Effects

XV. 4 H. Xu (Sp), I. Müller, Technische Universität Berlin (FRG)
Hysteresis in Shape Memory Alloys

XV. 5 J. Stoiber (Sp), R. Gotthardt, J. Van Humbeeck, Institut de Génie Atomique, Lausanne (Switzerland)
Interface Reactions During Martensitic Transformation in Cu-Zn-Al Shape Memory Alloys

Affiliation refers to speaker (Sp).

Poster Group XVI.

Electrodeposited Layers

XVI. 1 H. Wendt (Sp), K. Reuhl, V. Schwarz, Technische Hochschule Darmstadt (FRG)
Formation of TiB_2-Layers of High Quality on Carbon Substrate and TiB_2 (ZrB_2) Production by Cathodic Deposition from Fluoride Melts

XVI. 2 Z. Loizos (Sp), N. Spyrellis, G. Maurin, National Technical University of Athens (Greece)
Polycrystalline $CdSe_xTe_{1-x}$ Thin Films Prepared by Electroplating in an Aqueous Medium

XVI. 3 A. Argyriou (Sp), A. Tsitopoulos, N. Spyrellis, National Technical University of Athens (Greece)
Influence of Interfacial Adsorption on the Texture and the Microhardness of Nickel Electrodeposits

XVI. 4 A. Szász (Sp), J. Kojnok, W. Krasser, Z. Baráz, Eötvös University, Budapest (Hungary)
The Autocatalytic Build-up Process and the Resulting Special Interfaces

XVI. 5 C. Kollia (Sp), N. Spyrellis, National Technical University of Athens (Greece)
Modification of Microstructure and Properties in Nickel Electrodeposits by Using Reversed Current

Affiliation refers to speaker (Sp).

Poster Group XVII.

Biomaterials

XVII. 1 K. Mazanec (Sp), P. Filip, Technical University of Ostrava (CSSR)
The Optimal Technology for the Preparation of TiNi Fixation Elements

XVII. 2 J. Pirs, Technical Faculty Rijeka (Yugoslavia)
Failures of Orthopaedic Fixation Devices

XVII. 3 E. Wintermantel, ETH-Zentrum, Zürich (Switzerland)
Biocompatible Fibre Compounds: Automated Analysis of Quality Parameters by Comprehensive Image Processing

XVII. 4 S. Altintaş (Sp), M. A. Savaş, Boğaziçi University, Istanbul (Turkey)
Mechanical Properties vs Microstructural Features Relationship in Cow Femur

XVII. 5 M. Gheorghiu (Sp), G. Popa, "Al. I. Cuza" University, Iaşi (Romania)
Improving Blood Compatibility of Polyethylene Terephthalate by Ion Beam Treatments

Affiliation refers to speaker (Sp).

Poster Group XVIII.

Metal/Non-Metal Interfaces and Reactions

XVIII. 1 J. M. Kajda, M. G. Norton, B. C. H. Steele, Imperial College of Science and Technology, London (UK)
A Technique for Brazing Aluminium Nitride Substrates

XVIII. 2 F. Barbier (Sp), C. Peytour, P. Berthet, A. Revcolevschi, Université-Paris Sud, Orsay (France)
Interfacial Reactions in Al_2O_3-to-TA6V and ZrO_2-to-TA6V Brazements

XVIII. 3 M. Backhaus-Ricoult (Sp), M. Lancin, Laboratoire de Physique des Matériaux, Meudon (France)
Influence of Doping Elements and Geometry on the Interface Reactions Between SiC and Ti

XVIII. 4 A. Xian (Sp), Z. Si, Institute of Metal Research, Shenyang (China)
Interface Reaction Between Titanium and Silicon Nitride

XVIII. 5 M. J. Brabers (Sp), S. K. Choi, Katholieke Universiteit Leuven, Heverlee (Belgium)
Interaction Between Si_3N_4 and Transition Metals

XVIII. 6 J. J. Heizmann (Sp), A. Modaressi, A. Ahra, Université de Metz (France)
Study of the Phase Transformation Occurring During the Interfacial Reduction of Haematite

XVIII. 7 A. Stori (Sp), K. Redford, Senter for Industriforskning, Oslo (Norway)
Use of Silanes as Adhesion Promotors for Coatings on Steel in the Presence of Cathodic Protection

XVIII. 8 K. Hoffmann (Sp), M. Stratmann, Max-Planck-Institut für Eisenforschung, Düsseldorf (FRG)
Investigation of Phase Transformations in Iron Oxide Layers Between Steel Substrate and Polymer Coating

Affiliation refers to speaker (Sp).

Poster Group XIX.

Metal/Metal Reactions and Wetting

XIX. 1 L. Singheiser (Sp), H. W. Grünling, Asea Brown Boveri AG, Mannheim (FRG)
Chemical Compatibility of Coated Systems

XIX. 2 M. Blank-Bewersdorff (Sp), U. Köster, Universität Dortmund (FRG)
Interfacial Reactions in Metal Matrix/Metallic Glass Composites

XIX. 3 W. M. Stobbs (Sp), B. Soylu, R. E. Somekh, University of Cambridge (UK)
TEM Examination of Cu-Fe and Ni-Fe Metal Multilayers

XIX. 4 B. Schuhmacher (Sp), U. Köster, Universität Dortmund (FRG)
Contact Reactions at Thin Film Aluminium-Transition Metal Interfaces

XIX. 5 P. Ehrhart (Sp), M. Prieler, D. Guggi, W. Schilling, Kernforschungsanlage Jülich (FRG)
Interface Reactions During Ion Beam Assisted Deposition of Al Films

XIX. 6 L. Schultz (Sp), J. Eckert, E. Hellstern, K. Urban, Siemens AG, Erlangen (FRG)
Interfacial Reactions During Mechanical Alloying

XIX. 7 S. Martelli (Sp), G. Mazzone, A. Montone, F. Padella, M. Vittori, ENEA-TIP, Roma (Italy)
Solid State Reactions in the Ni-Sn System Induced by Cold Rolling and Mechanical Alloying

XIX. 8 E. R. Wallach (Sp), W. F. Gale, University of Cambridge (UK)
High-Temperature Brazing of Nickel Alloys

XIX. 9 J. C. Ambrose (Sp), M. G. Nicholas, Harwell Laboratory, Didcot (UK)
Real Time Observations of the Wetting and Spreading Behaviour of Nickel Braze Alloys

Affiliation refers to speaker (Sp).

Poster Group XX.

Testing and Characteristics of Coatings

XX. 1 C. Schmutz (Sp), S. Tranganida, J. P. Jeanneret, H. E. Hintermann, Centre Suisse d'Electronique et de Microtechnique S.A., Neuchâtel (Switzerland)
New Tool for the Characterization of Coatings

XX. 2 H. Teodorescu (Sp), E. Sofron, C. Teodorescu, Technical University of Iasi (Romania)
Characterisation of Adhesion by the OEMS Method and MEEM

XX. 3 R. Feser (Sp), M. Stratmann, Max-Planck-Institut für Eisenforschung, Düsseldorf (FRG)
Investigation of Corrosion Reactions Under Organic Coatings with AC-Impedance Spectroscopy

XX. 4 D. Dew-Hughes (Sp), J. C. Bilello, University of Oxford (UK)
Synchrotron-Radiation Bragg-Angle Contour Mapping: A New Method for Probing Localized Strains at Interfaces

XX. 5 J. J. Heizmann (Sp), D. Schlatter, A. Vadon, J. Bessières, Université de Metz (France)
Crystallographic Texture of Thin Films Obtained by Low Incident X-Ray Texture Goniometry

XX. 6 J. Lu (Sp), J. F. Flavenot, CETIM, Senlis (France)
Residual Stress Distribution and Microstructure in High Temperature Coating Materials

XX. 7 S. C. Gill, University of Cambridge (UK)
The Development of Residual Stresses During Spray Deposition

XX. 8 J. Búza (Sp), M. Ferdinandy, J. Král, D. Liška, I. Pecár, VUKOV, Košice (CSSR)
Multilayer Abrasion Resistant PVD Coatings

XX. 9 A. Schüßler (Sp), F. Bellucci, R. M. Latanision, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
NaCl Permeation Through Polyimide Films

XX. 10 K. Redford (Sp), A. Stori, J. Roots, Senter for Industriforskning, Oslo (Norway)
Water Uptake in a Corrosion Protective Coating System

XX. 11 H. Cichy (Sp), K. E. Roeser, Siemens AG, München (FRG)
Effect of the Uniformity of Al-Si Sputtering Targets on Their Sputtering Behaviour

XX. 12 P. G. Koutsoukos (Sp), E. Dalas, J. Kallitsis, L. Kobotiatis, E. Koumanakos, University of Patras (Greece)
Deposition of Polycrystalline In_2S_3 on Modified Polyaniline Substrates

XX. 13 J. Weiss (Sp), T. Loose, C. Leppin, W. Mader, Renker GmbH & Co KG, Freiburg (FRG)
SiO_{2-x} Coatings on Polyester Films: Preparation and Properties

Affiliation refers to speaker (Sp).

Poster Group XXI.

Testing and Characteristics of Electronic and Magnetic Materials

XXI. 1 L. De Schepper (Sp), L. M. Stals, R. Van Den Berghe, S. De Molder, Limburgs Universitair Centrum, Diepenbeek (Belgium)
A New Method for Studying Accelerated Ageing of Interconnection Materials Applied to Thick Film Resistors

XXI. 2 L. De Schepper (Sp), L. Tielemans, J. Roggen, L. M. Stals, Limburgs Universitair Centrum, Diepenbeek (Belgium)
Accurate Measurements and Interpretation of Resistance Changes in Off-Chip Interconnections due to Ageing in an Inert Gas Atmosphere

XXI. 3 N. Sotnik (Sp), S. Bräuer, H. Pagnia, W. Wirth, Technische Hochschule Darmstadt (FRG)
Potential Distribution on Thin Carbon Films Investigated by a Scanning Tunneling Microscope

XXI. 4 R. Pufall (Sp), M. Weber, K. E. Roeser, Siemens AG, München (FRG)
Determination of Mechanical Stresses in Plastic Encapsulated Chips by X-Ray Diffraction

XXI. 5 K. Burger, Telefunken Electronic, Heilbronn (FRG)
Electromigration: Microstructural Investigation, Failure Analysis and Life-Time Measurements

XXI. 6 R. Köller (Sp), A. Kranzmann, G. Petzow, Max-Planck-Institut für Metallforschung, Stuttgart (FRG)
The Dielectric Strength of AlN Ceramics

XXI. 7 S. M. El-Mashri (Sp), M. M. Khalifa, M. N. Avasthi, Tajura Nuclear Research Centre, Tripoli (Libya)
Study of a New Solid Super-Ionic Conductor Material $Ag_7P_3S_{11}$

XXI. 8 I. Nihtianov (Sp), D. Tchavdarova, D. Popov, Institute for Non-Ferrous Metallurgy, Plovdiv (Bulgaria)
Investigation on Growth of Semi-Insulating Undoped and Isoelectronically Doped Gallium Arsenide of Diameter 76 mm for High-Speed Integrated Circuits

XXI. 9 J. L. Sanchez (Sp), F. Leccabue, R. Panizzieri, G. Bocelli, G. Calestani, Universidad de La Habana (Cuba)
Structural and Magnetic Study of High Coercivity As-Cast Rare Earth/Iron Alloys for Permanent Magnets

XXI. 10 D. Challeton, Centre d'Etudes Nucléaires de Grenoble (France)
Ferromagnetic Oxide Thin Films for Magneto-Optical Recording

XXI. 11 S. N. Roy (Sp), S. K. Guha, H. S. Maiti, Technische Universität Berlin (FRG)
Electrical Conductivity of Chromium (III) Oxide

Affiliation refers to speaker (Sp).

Poster Group XXII.

Fundamentals of Mechanical Testing and Strengthening

XXII. 1 J. Rösler, University of California, Santa Barbara (USA)
Dispersion Strengthening in High Temperature Materials: New Theoretical Concepts for its Optimization

XXII. 2 B. Reppich (Sp), G. Schumann, Universität Erlangen-Nürnberg (FRG)
The Stress Exponent of Particle-Strengthened Alloys

XXII. 3 J. Caisso (Sp), M. Cahoreau, M. Fumeron, Faculté des Sciences de Poitiers (France)
Coherent Particles for Strengthening of Internally Oxidized Copper Alloys

XXII. 4 M. A. Kattis, Democritus University of Thrace, Xanthi (Greece)
The Temperature and the Thermoelastic State in an Infinite Matrix Containing a Partly Unbonded Rigid Fiber

XXII. 5 S. Sanchez Beitia, INASMET, San Sebastian (Spain)
An Overall Scheme for Resolution of the Creep/Fatigue Interaction Problem Under Thermomechanical Loads

XXII. 6 C. Honsel (Sp), K. Weiß, RWP Gesellschaft beratender Ingenieure für Berechnung und rechnergestützte Simulation mbH, Aachen (FRG)
Simulation of Internal Tension, Structure and Mechanical Properties

XXII. 7 D. Dew-Hughes (Sp), H. A. Schmitz, J. C. Bilello, University of Oxford (UK)
Crack Nucleation and Propagation in Zinc Bicrystals

Affiliation refers to speaker (Sp).

Poster Group XXIII.

Grain Boundaries

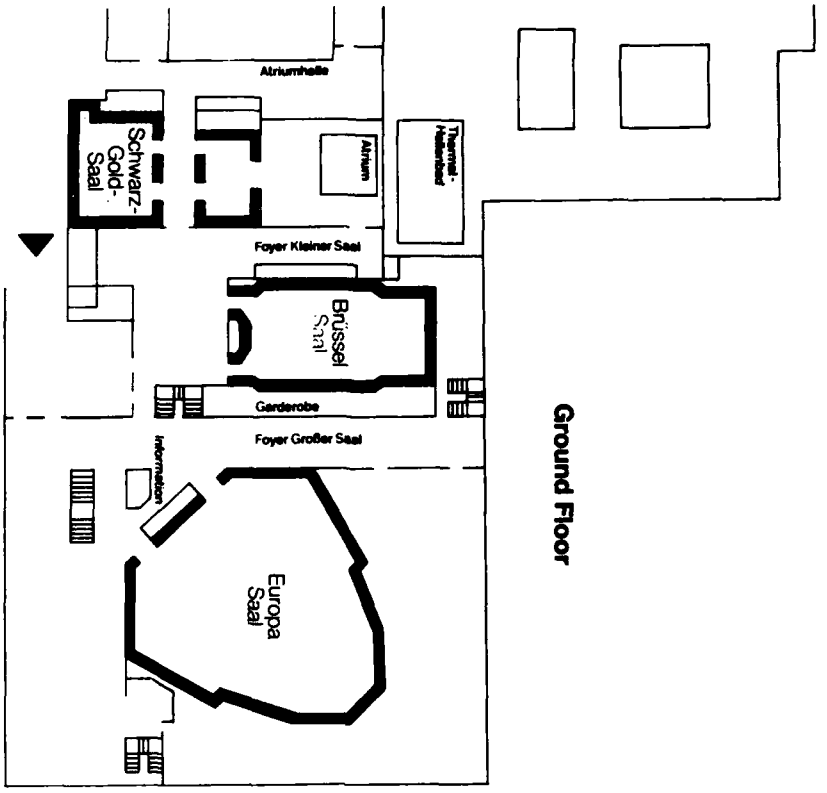
XXIII. 1 V. Randle (Sp), D. J. Dingley, University of Bristol (UK)
The Orientation of Grain Boundary Planes in Polycrystals

XXIII. 2 N. Sotnik (Sp), S. Bräuer, B. Krämer, H. Pagnia, W. Wirth, Technische Hochschule Darmstadt (FRG)
Experiments on Material Distribution Analysis with a Scanning Tunneling Microscope

Affiliation refers to speaker (Sp).

List of Authors*

*Refers to the program



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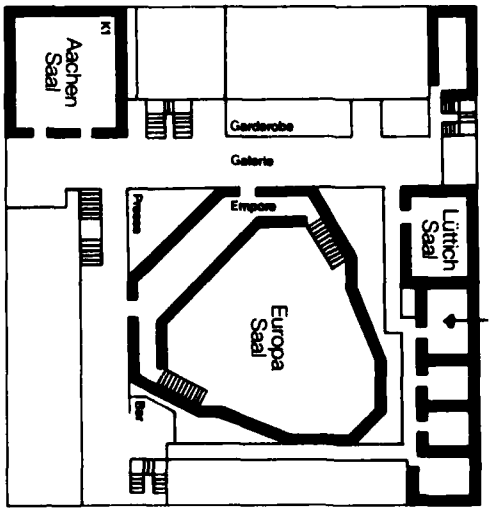
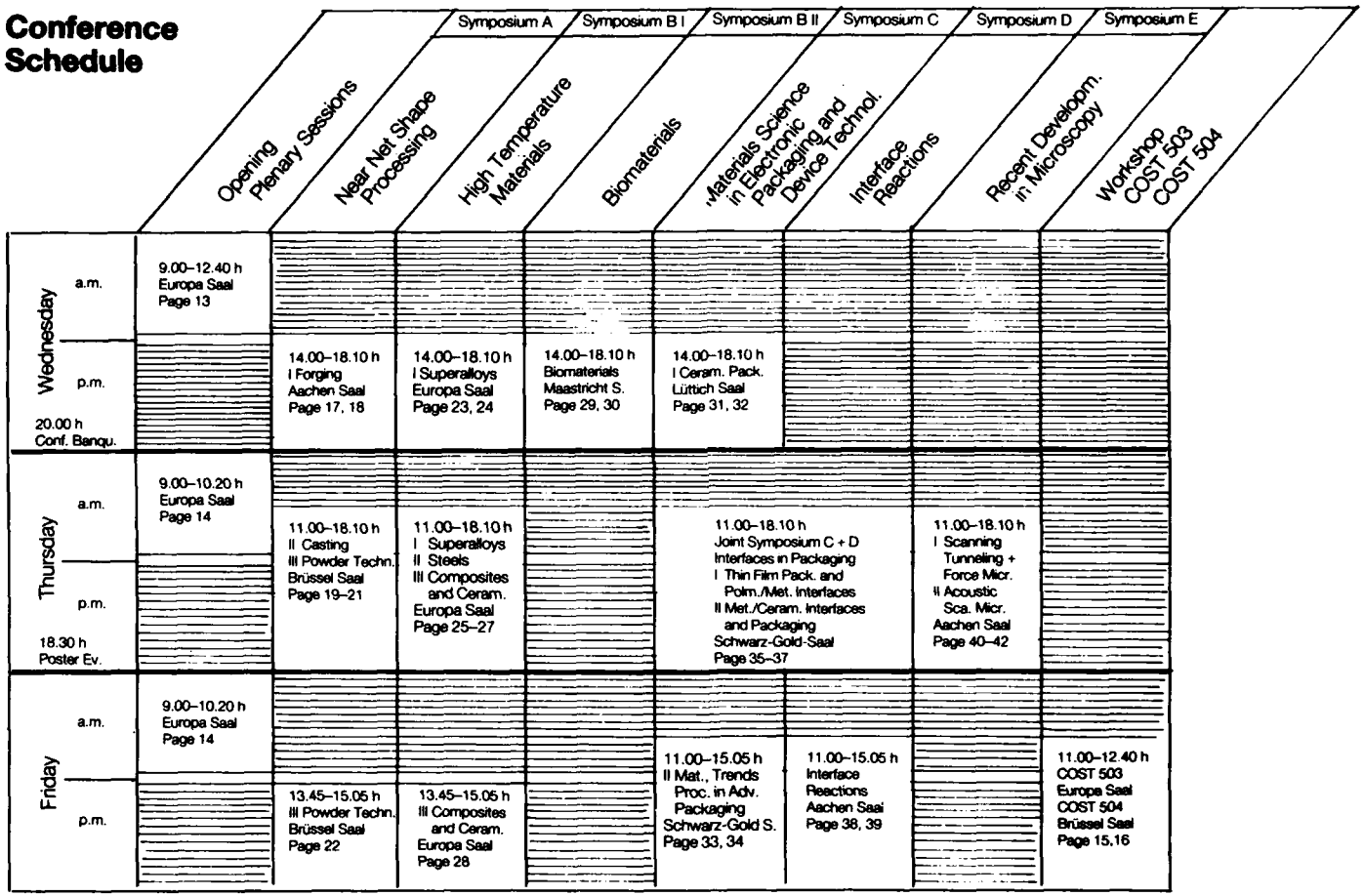


Upper Floor

Conference Schedule



		Opening Plenary Sessions	Near Net Shape Processing	High Temperature Materials	Biomaterials	Materials Science in Electronic Packaging and Device Technol.	Interface Reactions	Recent Developm. in Microscopy	Workshop COST 503 COST 504
			Symposium A		Symposium B I	Symposium B II	Symposium C	Symposium D	Symposium E
Wednesday	a.m.	9.00–12.40 h Europa Saal Page 13							
	p.m.		14.00–18.10 h I Forging Aachen Saal Page 17, 18	14.00–18.10 h I Superalloys Europa Saal Page 23, 24	14.00–18.10 h Biomaterials Maastricht S. Page 29, 30	14.00–18.10 h I Ceram. Pack. Lüttich Saal Page 31, 32			
	20.00 h Conf. Banqu.								
Thursday	a.m.	9.00–10.20 h Europa Saal Page 14							
	p.m.		11.00–18.10 h II Casting III Powder Techn. Brüssel Saal Page 19–21	11.00–18.10 h I Superalloys II Steels III Composites and Ceram. Europa Saal Page 25–27		11.00–18.10 h Joint Symposium C + D Interfaces in Packaging I Thin Film Pack. and Polm./Met. Interfaces II Met./Ceram. Interfaces and Packaging Schwarz-Gold-Saal Page 35–37		11.00–18.10 h I Scanning Tunneling + Force Micr. II Acoustic Sca. Micr. Aachen Saal Page 40–42	
	18.30 h Poster Ev.								
Friday	a.m.	9.00–10.20 h Europa Saal Page 14							
	p.m.		13.45–15.05 h III Powder Techn. Brüssel Saal Page 22	13.45–15.05 h III Composites and Ceram. Europa Saal Page 28		11.00–15.05 h II Mat., Trends Proc. in Adv. Packaging Schwarz-Gold S. Page 33, 34	11.00–15.05 h Interface Reactions Aachen Saal Page 38, 39		11.00–12.40 h COST 503 Europa Saal COST 504 Brüssel Saal Page 15,16

Notice