

AD-A101 034

INSTITUTE FOR DEFENSE ANALYSES ARLINGTON VA SCIENCE A--ETC F/8 11/6
DIRECTORY OF ORGANIZATIONS, INVESTIGATORS, SPONSORS, AND PROGRA--ETC(U)
MAY 81 T F KEARNS

UNCLASSIFIED

IDA-P-1584

IDA/HQ-81-23533

MDA903-79-C-0202

NL

03
AD A
10 0 54

END
DATE
FILMED
7-81
DTIC

AD-E 500 338

Copy 36 of 310 copies

(12) LEVEL III

IDA PAPER P-1584

DIRECTORY OF ORGANIZATIONS,
INVESTIGATORS, SPONSORS, AND PROGRAMS
IN RAPID SOLIDIFICATION TECHNOLOGY

T. F. Kearns

May 1981

DTIC
ELECTE
JUL 7 1981
B

Prepared for
Defense Advanced Research Projects Agency

DISTRIBUTION STATEMENT A

Approved for public release;
Distribution Unlimited



INSTITUTE FOR DEFENSE ANALYSES
SCIENCE AND TECHNOLOGY DIVISION

81 6 19 032

IDA Log No. HQ 81-23533

AD A101084

DTIC FILE COPY

The work reported in this document was conducted under contract MDA 903 79 C 0202 for the Department of Defense. The publication of this IDA Paper does not indicate endorsement by the Department of Defense, nor should the contents be construed as reflecting the official position of that agency.

Approved for public release; distribution unlimited.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
	AD-A201	034
4. TITLE (and Subtitle)		5. TYPE OF REPORT & PERIOD COVERED
DIRECTORY OF ORGANIZATIONS, INVESTIGATORS, SPONSORS, AND PROGRAMS IN RAPID SOLIDIFICATION TECHNOLOGY		Final
7. AUTHOR(s)		6. PERFORMING ORG REPORT NUMBER
T.F. Kearns		IDA Paper P-1584
9. PERFORMING ORGANIZATION NAME AND ADDRESS		8. CONTRACT OR GRANT NUMBER(s)
Institute for Defense Analyses 400 Army-Navy Drive Arlington, VA 22202		MDA 903 79 C 0202
11. CONTROLLING OFFICE NAME AND ADDRESS		10. PROGRAM ELEMENT PROJECT TASK AREA & WORK UNIT NUMBERS
Assistant Director, Materials Sciences Defense Advanced Research Projects Agency 1400 Wilson Blvd, Arlington, VA 22202		A-67
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE
Defense Advanced Research Projects Agency 1400 Wilson Boulevard Arlington, VA 22202		May 1981
		13. NUMBER OF PAGES
		41
		15. SECURITY CLASS (of this report)
		UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
		NA
16. DISTRIBUTION STATEMENT (of this Report)		
Approved for public release; distribution unlimited		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
Rapid solidification technology		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)		
The Institute for Defense Analyses (IDA) was asked by the Defense Advanced Research Projects Agency (DARPA) to make an assessment of rapid solidification technology (RST) and its Department of Defense applications. In doing so, it was appropriate to identify the organizations, investigators, sponsors and programs active in the field in the United States and Canada. Emphasis in the IDA assessment is on (continued)		

DD FORM 1473

EDITION OF 1 NOV 68 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

20. Continued

materials of construction rather than on electrical or magnetic materials.

The Directory lists 115 organizations active in the field with addresses, names, and telephone numbers of about 250 investigators, and 21 sponsoring organizations. It includes also a listing of topics being studied by the various organizations.

DTIC
ELECTE
S JUL 7 1981 **D**
B

Accession For	
NTIS GRA&I	☒
DTIC TAB	☐
Unannounced	☐
Justification	
By	
Distribution/	
Availability Codes	
Avail and/or	
Dist	Special
A	

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

IDA PAPER P-1584

DIRECTORY OF ORGANIZATIONS,
INVESTIGATORS, SPONSORS, AND PROGRAMS
IN RAPID SOLIDIFICATION TECHNOLOGY

T. F. Kearns

May 1981



INSTITUTE FOR DEFENSE ANALYSES
SCIENCE AND TECHNOLOGY DIVISION
400 Army-Navy Drive, Arlington, Virginia 22202

Contract MDA 903 79 C 0202
DARPA Assignment A-67

FOREWORD

The Institute for Defense Analyses (IDA) was asked by the Defense Advanced Research Projects Agency (DARPA) to make an assessment of rapid solidification technology (RST) and its Department of Defense applications. In doing so, it was appropriate to identify the organizations, investigators, sponsors, and programs active in the field in the United States and Canada. Inasmuch as emphasis in the IDA assessment is on materials of construction rather than on electrical or magnetic materials, that emphasis was reflected in this survey.

The information contained in the directory was compiled by starting with a list of investigators, and their organizations, who had published papers in the field. To these a direct mail questionnaire was sent, requesting information on current activity and future plans, together with identification of others, not on the original list, thought to be active in the field. No attempt was made to identify individual investigators. Organizations were asked only for the names and telephone numbers of appropriate contacts and the topics being studied.

As in any such compilation made over a brief period, there will be omissions, particularly of organizations which may be evaluating RST products. Lack of response to the questionnaire has probably also resulted in omissions. However, we believe that most of the organizations active in RST research and development have been identified. These are listed alphabetically in Section I of the directory with addresses, the names of contacts, telephone numbers, and the topics being investigated.

In Section II, agencies which are, or are likely to be, sponsoring RST research and development are listed, again with addresses, the names of appropriate contacts, and telephone numbers. The "S" following the numbers of agencies in Section II indicates "sponsor" and was used to simplify reference to people in Section III. In Section III contact names are listed alphabetically. It will be noted that several people are listed both as sponsors and as contacts for work being done within their organizations.

We believe that the directory affords an overview of work in progress and that it will help assessment of the distribution of effort, areas of emphasis, possible gaps, and objectives not being effectively pursued. It is being distributed to respondents to the questionnaire and to others with the hope that it may facilitate communications in the field, thus improving efficiency and accelerating the rate of progress in research and development efforts.

SECTION I - ORGANIZATIONS, INVESTIGATORS, AND PROGRAMS

1. Air Force Wright Aeronautical Laboratories

Flight Dynamics Laboratory

Wright Patterson Air Force Base, OH 45433

L.G. Kelly AFWAL/FIBCB (513) 255-2521

F.D. Boensch AFWAL/FIBAA (513) 255-5006

Programs:

1. Structural concepts evaluation

2. Air Force Wright Aeronautical Laboratories

Materials Laboratory

Wright Patterson, Air Force Base, OH 45433

Dr. H. Burte (513) 255-5348

Dr. D. Voss (513) 255-4018

G. Eichelman (513) 255-4018

Dr. H. Graham (513) 255-4402

Programs:

1. High-strength aluminum alloy powder metallurgy
2. Titanium/titanium alloy powder metallurgy
3. Superalloy powder metallurgy
4. Aluminides powder metallurgy
5. Coatings

3. Allied Chemical Corporation

Columbia Turnpike, P.O. Box 1021R

Morristown, NJ 07960

Materials Laboratory, Corporate R&D

Dr. Lance A. Davis (201) 455-2001

Metglas Products

Dr. Nicholas J. Decristofaro (201) 455-2976

Consolidated Metal Products

Julian H. Kushnick (201) 455-2361

Dr. J. Dickson (201) 455-2504

Programs:

1. Alloy development of ferromagnetic metallic glasses
2. Process development for fabrication of glassy metal strips
3. Development of technology for fabrication of Metglas distribution transformer material
4. Development of rapid solidification technology for powder production
5. Structure/property relationships in devitrified glassy powders

6. Amorphous ribbon for brazing foils, magnetic and other applications.
 7. Rapidly solidified metal powders for powder metallurgy consolidation into bulk shapes for high temperature, wear-resistant, and structural applications.
4. Alcoa Laboratories
Alcoa Center, PA 15069
 - W.S. Cebulak, Mgr. RSP Alcoa Labs. (412) 337-2324
 - H.G. Paris, Tech. Sup. Dev. Act. RSP (412) 337-2751
 - F.R. Billman, Tech.Spec. Proc. Dev. RSP (412) 337-2851
 1. Elevated-temperature aluminum alloy development
 2. Advanced aluminum alloy from rapidly solidified particulate
 3. Precision aluminum alloy powder metallurgy structural components
 4. Low-cost manufacturing methods for high-strength P/M aluminum wrought products
 5. Fundamentals of compaction processes for rapidly quenched prealloyed metal powders
 6. Cobalt-free high-strength aluminum P/M alloy
 5. Ames Laboratory (DOE)
Iowa State University
Ames, IA 50011
 - R.S. Hansen (512) 294-4446
 - C.W. Chen

Programs:

 1. Fabrication of amorphous ribbons (Fe-B-Be and Fe-B-Au) by splat cooling and magnetic properties and crystallization behavior of these ribbons.
 6. Argonne National Laboratory
Materials Science Division
9700 S. Cass Avenue
Argonne, IL 60439
 - R. Dowagala (312) 972-5094
 - T. Wiencek (312) 972-5020
 1. The development of corrosion-resistant chromium-free ferrous alloys (a rapid solidification activity will be part of this program)
 7. ARMCO INC.
Research & Technology
703 Curtis Street
Middletown, OH 45043
 - C.E. Ward (513) 425-2797

Programs:

 1. Evaluate the magnetic properties of amorphous metals (rapidly solidified alloys) for use in transformers

8. U.S. Army Applied Technology Laboratory
Fort Eustis, VA
J.M. Lane (804) 878-3977
Programs:
1. Evaluation of RST alloys
9. U.S. Army Armament Research and Development Command (ARPA/COM)
DRDAR-SCM-P Bldg. 355
Dover, NJ 07801
Dr. J. Waldman (201) 328-5811
M. Kumar (201) 328-5816
Programs:
1. Characterization of rapidly solidified high-strength aluminum alloys
2. Thermal-mechanical processing of RST aluminum alloys
10. U.S. Army Armament Research and Development Command
Metallic Materials Branch Bldg. 355
Dover, NJ 07801
Dr. S.J. Cytron (201) 328-5746
Dr. M. Otooni (201) 328-5746
Programs:
1. Rapid solidification technology of armament materials
2. Processing of rapidly solidified high-density metal alloys
3. Kinetics of crystallization of rapidly solidified alloys
11. U.S. Army Armament Research and Development Command
Physical Science Section, Research Branch, Benet
Weapons Laboratory
Watervliet Arsenal, Watervliet, NY 12189
Dr. Iqbal Ahmad (518) 266-5615
Mr. Joe Barranco (518) 266-5645
Programs:
1. Study effect of cooling rate on the structure and properties of molybdenum powders made by REP.
2. Develop and characterize molybdenum alloy powders suitable for defense applications.
3. Study kinetics of sintering and densification of RS molybdenum alloy powders, and determine the mechanical behavior of the densified alloys in the temperature range of RT-1200°C.
12. U.S. Army Materials and Mechanics Research Center (AMMRC)
DRXMR-KA
Watertown, MA 02172
S. Isserow (617) 923-3504
Programs:
1. Evaluation of RST alloys

13. U.S. Army Mobility Equipment Research and Development Command (MERADCOM)
DRDME-EM
Fort Belvoir, VA 22060
W.F. McGovern (703) 664-5459
Programs:
1. Evaluation of RST superalloys
14. Avco Lycoming Division
Materials Engineering and Development
550 S. Main Street
Stratford, CT 06497
L.J. Fiedler (203) 378-8211 x229
Dr. P.J. Bania
Programs:
1. Evaluation of high-temperature properties of RST materials
15. Battelle Columbus Laboratories
505 King Avenue
Columbus, OH 43201
Dr. R.S. Carbonara (614) 424-5440
R.E. Maringer (614) 424-4314
J.L. McCall (614) 424-4030
Programs:
1. Processes for the production of rapidly solidified amorphous and microcrystalline strip, fibers, flakes, and powder
2. Consolidation of rapidly solidified amorphous and microcrystalline metals
3. Characterization of structural, corrosion, mechanical, and electromagnetic properties of rapidly solidified materials
4. Application of rapidly solidified materials to industrial and government needs
5. Production of superalloy and Ti-, Al-, Cu-, Ni-, Fe-, Zn-, Sn-, Pb-based alloy powders, fibers, flakes and strip
6. Economic analysis of rapid solidification processes
16. Battelle Pacific Northwest Laboratory
P.O. Box 999
Richland, WA 99352
S.D. Dahlgren (509) 375-0120
J.T. Prater
D.P. Baer
W.T. Pawlewicz
J.W. Patten
M.D. Merz

Programs:

1. Oxidation and corrosion resistance of sputter-deposited fine-grained and amorphous metals.
2. Influence of sputtering parameters on structure and behavior of sputter-deposited metallic and insulator materials

17. Bell Telephone Laboratories

Mountain Avenue

Murray Hill, NJ 07974

K.A. Jackson

(201) 582-4188

Dr. M.L. Green, Rm. 1B301

(201) 582-5310

1. Basic studies of interface dynamics during rapid solidification
2. Segregation effects during high-speed crystallization

18. Bethlehem Steel Corporation

Homer Research Labs.

Bethlehem, PA 18016

Dr. J.M. Chilton

(215) 694-3320

Dr. B.L. Bramfitt

(215) 694-6485

Dr. H.E. Townsend

(215) 694-6674

1. Application of RST to wear-resistant high alloy irons
2. Application of RST to electrical and magnetic steel sheet
3. Corrosion of RST metals

19. The Boeing Company

P.O. Box 3707, M/S 73/43

Seattle, WA 98124

Dr. Wm. E. Quist (BCAC)

(206) 237-5650

Dr. G. Hari Naranayan (BCAC)

(206) 237-5650

Dr. K. B. Das (BAC)

(206) 237-9725

1. Development of high-strength aluminum P/M alloys
2. High-strength powder metallurgy aluminum mill products
3. Commercial aircraft applications of X7090 and X7091 P/M alloy forgings and extrusion products
4. Development of surface finish systems for the P/M alloy X7090
5. Cobalt-free high-strength aluminum P/M alloy
6. Development of SiC (particulates and whiskers) reinforced X7090 metal matrix composites
7. Development and assessment of lithium-bearing aluminum P/M alloys (new program)

20. Brown University

Department of Engineering - Physics

Brown Station

Providence, RI 02912

Prof. J. Tauc

(401) 863-1000

1. Stability of metallic glasses

21. Bureau of Mines (DOI)
 2401 E Street, N.W.
 Washington, DC 20241
 K.W. Mlynarski, Rm. 813 (202) 634-1138
 Programs:
 1. Titanium RST alloys (Albany OR)
 2. Ceramics (Tuscaloosa AL)

22. Cabot Corporation
 Technology Department
 1020 West Park Avenue
 Kokomo, IN 46901
 Christian L. Jeanfils (317) 456-6251
 Anthony J. Hickl (317) 456-6216
 Programs:
 1. Hardfacing by welding: this research program is planned to start in the summer of 1981
 2. Powder atomization techniques, high-solidification-rate techniques for superalloy powers

23. University of California at Los Angeles
 Dept. of Materials Engineering
 405 Hilgard Avenue
 Los Angeles, CA 90024
 Prof. C.N.J. Wagner (213) 825-6265
 Programs:
 1. Structure of liquid and amorphous metallic alloys and structural relaxation of metallic glasses

24. California Institute of Technology
 1201 E. California Blvd.
 Pasadena, CA 91125
 Prof. T.J. Ahrens, Dept. of Physics (213) 795-6811
 Prof. T. Vreeland, Jr. Dept. of
 Matls Science
 Dr. J. Mayer, Dept. of Electrical Engr.
 Dr. W.L. Johnson, Div. of Engr.
 & Applied Science
 Programs:
 1. Dynamic compaction of iron and steel powders
 2. Powder production via ion beam heating
 3. Synthesis, structure, and properties of amorphous alloys

25. Carnegie-Mellon University
 Department of Metallurgical Engr. and Materials Science
 5000 Forbes Avenue
 Pittsburgh, PA 15213
 Prof. J.C. Williams (412) 578-2704
 Prof. R.G. Sekerka (412) 578-2700
 Prof. F. Prinz, Dept. of Mechanical Engr.

Programs:

1. Kinetics, morphology, and thermodynamics of solid-liquid transition
2. Properties and microstructure of rapidly solidified Ni-Mo-Al-X alloys
3. Powder metallurgy aluminum alloys for high temperature

26. Carpenter Technology Corporation

P.O. Box 662

Reading, PA 19603

Donald R. Muzyka, Division Vice

President-Technical

(215) 371-2657

Gurvant N. Maniar, General Manager
of R&D Laboratories

(215) 371-2783

Programs:

1. Inert gas atomized specialty materials, superalloys, tool steels, stainless and other high alloys
2. Water atomized P/M pilot plant
3. Direct compaction of water-atomized elemental and alloy P/M
4. Compaction technology as it relates intermediate shapes from P/M

27. Clarkson College of Technology

Department of Physics

Potsdam, NY 13676

Prof. S. Arajs

(315) 268-2396

Prof. R. Caton

(315) 268-2350

Programs:

1. Electric and magnetic properties of glassy and amorphous materials.
2. Effects of radiation (neutrons, protons, electrons,) on glassy materials.
3. Preparation of glassy materials by spinning method.
4. Crystallization phenomena in glassy structures.

28. Climax Molybdenum Company

Division of AMAX Inc.

1600 Huron Parkway

Ann Arbor, MI 48106

Dr. M. Semchyshen

(313) 761-2300

Programs:

1. Research in RST

29. Columbia University

918 Mudd Building

New York, NY 10027

Prof. John K. Tien

(212) 280-5192

Programs:

1. Comparative study of RSR superalloy powders and consolidated structures and argon atomized powders and structures

30. University of Connecticut

Metallurgy Department

Storrs, CT 06268

Prof. Peter R. Strutt

(203) 486-3514

Brian G. Lewis

(203) 486-4620

Mohan Kurup

Jing-gu-Zhang

Bernard H. Kear (Adjunct Prof. at Univ. of Conn.).

Programs:

1. Electron Beam/Laser Glazing of Iron-Base Materials (P.R. Strutt, B.G. Lewis, and Mohan Kurup). This study is involved with the fundamental aspects of rapidly solidified tool steels and iron-base cemented carbide materials, including microstructural characterization and the microstructural dependence on process parameters such as power density and beam velocity. Another aspect involves wear and fatigue fretting studies of glazed surfaces produced by a specially developed programmable beam deflection system.
2. Electron Microscopy of Electron Beam Glazed Alloys (Jing-gu-Zhang). A basic investigation of the complex microstructures in rapidly solidified steels using quantitative diffraction contrast analysis.

31. Cornell University

Materials Science Center

Clark Hall

Ithaca, NY 14853

H.H. Johnson

(607) 256-4272

D.G. Ast

N.W. Ashcroft

Programs:

1. Mechanical properties of amorphous metals
2. Theoretical studies of ordered and disordered systems

32. Crucible Research Center

Colt Industries, Inc.

Route 60 and Parkway West

Robinson Twp.,

Pittsburgh, PA 15205

Mailing Address: P.O. Box 88, Pittsburgh, PA 15230

E.J. Dulis

(412) 923-2955

J.H. Moll

Programs:

1. HIP of large Ti P/M shapes
2. Dual property integral turbine wheel
3. Production of advanced turbine engine components to near-net shapes by hot isostatic pressing superalloy powder
4. Long-life engine discs from RSR powder
5. Powder cleanliness improvement program

6. ER welded HIP nacelle frame
 7. New and improved cutting and forming tool steels by CPM process
 8. New method for making high-quality Ti alloy powder
 9. Improved containerization methods for making P/M shapes
33. University of Delaware
 Department of Physics
 Newark, DE 19711
 Dr. D.G. Onn (302) 738-2680
 Programs:
 1. Radiation effects in amorphous metallic alloys
34. Drexel University
 Department of Materials Engineering
 32nd and Chestnut Streets
 Philadelphia, PA 19104
 Prof. Alan Lawley (215) 895-2326
 1. High-chromium white irons from rapidly solidified powders - structure vs properties
 2. Tool steels from rapidly solidified powders - structure vs properties
 3. High-strength aluminum alloys from rapidly solidified powders-fatigue response
 4. Elevated-temperature aluminum alloys from rapidly solidified powders (planned)
35. DWA Composite Specialties, Inc.
 21133 Superior Street
 Chatsworth, CA 91311
 Dr. W.C. Harrigan (213) 998-1504
 J.F. Dolowy, Jr.
 B.A. Webb
 E.C. Supan
 Programs:
 1. Processing to stiff, strong-particulate-reinforced aluminum materials with isotropic properties
 2. Developing constituent interaction models for RST light metals reinforced with ceramic particulate material
 3. Processing development to produce forged and extruded structures from particulate-reinforced RST forms of aluminum and magnesium
36. Exxon Enterprises - Materials Division
 P.O. Drawer H, Old Buncombe at Poplar
 Greer, SC 29651
 J.O. Pickens (803) 877-0123
 P.E. Hood
 1. RSR/Silicon carbide whisker composites

37. University of Florida
 Department of Materials Science and Engineering
 Gainesville, FL 52611
 Dr. R.W. Gould (904) 392-1457
 1. Rapidly solidified Ni-Al-Mo alloy research, characterization
38. Garrett Turbine Engine Company
 A Division of The Garrett Corporation
 111 South 34 Street, P.O. Box 5217
 Phoenix, AZ 85010
 Dr. T.E. Strangman (602) 267-4399
 P.P. Millan, Jr. (602) 267-4129
 Programs:
 1. Advanced turbine airfoil alloys
 2. High-temperature-capability disk alloys
 3. High-temperature-capability aluminum alloys
39. General Electric Company
Aircraft Engine Group
 Material and Process Technology Laboratory
 Evendale Plant
 I-75 & Newmann Way
 Cincinnati, OH 45215
 A.M. Johnson (513) 243-5085
 Programs:
 1. Long life engine disks from gas-atomized powders
 2. Melt spinning
 3. Rapid solidification plasma deposition
40. General Electric Corporate Research and Development
Schenectady, NY 12301
 Dr. H.H. Liebermann (518) 385-8072
 Dr. R.G. Rowe (518) 385-8387
 Dr. L.A. Johnson (518) 385-8181
 Programs:
 1. Melt-spinning of Ni-Base superalloys
 2. Processing and properties of amorphous alloys for electromagnetic applications.
41. Georgia Institute of Technology
Fracture and Fatigue Research Laboratory
School of Chemical Engineering
 Atlanta, GA 30332
 Dr. Edgar A. Starke, Jr. (404) 894-2880
 Dr. Thomas H. Sanders (404) 894-2816
 Programs:
 1. Advanced aluminum alloys from rapidly solidified powders

42. Gould Laboratories Materials Research
 Gould Inc.,
 540 East 105th Street
 Cleveland, OH 44108
 Dr. David H. Po (216) 371-8718
 Programs:
 1. Direct rolling of high-strength aluminum powder metal strip
 2. Evaluation of rapidly solidified aluminum alloy powders for high-temperature applications
 3. Manufacturing techniques for high-strength aluminum near-net-shapes
 4. Manufacturing techniques for SiC/Al composite
 5. Microstructural analysis of rapidly solidified aluminum alloy powders
43. GTE Laboratories Incorporated
 Precision Materials Technology Center
 40 Sylvan Road
 Waltham, MA 02254
 Dr. R.P.I. Adler (617) 890-8460
 Dr. S.C. Hsu (617) 890-8460
 Dr. D.M. Koffman (617) 890-8460
 Programs:
 1. Rapid Solidification Process Development and Implementation Studies
 a. Analytical Process Characterization
 1) Heat and mass transfer modeling
 2) Process parameter characterization
 b. Process Development/Industrial Upscaling for:
 1) Chill block melt spinning
 2) Double roller melt spinning
 3) Melt extraction (crucible and pendant drop)
 4) Powder making
 5) Composite and laminate production
 c. Materials Evaluation of Amorphous, Microcrystalline, and Crystalline products
 1) Characterization of as-formed products
 2) Post forming thermo-mechanical treatments of metastable products
44. Harvard University
 Division of Engineering and Applied Physics
 Cambridge, MA 02138
 Prof. D. Turnbull (617) 868-7600
 Programs:
 1. Formation of metallic glasses
45. University of Hawaii at Manoa
 2500 Campus Road
 Honolulu, HI 96822

- B.E. Liebert
 Programs:
 1. Basic research in RST
46. Homogeneous Metals, Inc.
 P.O. Box 294
 Clayville, NY 13322
 Charles W. Fox (315) 839-5421
 Programs:
 1. Development of atomization technique
 2. Direct consolidation of powders
47. Howmet Turbine Components Corp.
 475 Steamboat Road
 Greenwich, CT 06830
 Wm. R. Freeman, Jr. (203) 661-7218
 Louis L. Dardi (616) 894-7562
 Programs:
 1. Development of rapid solidification processing equipment
 2. Alloy development
48. University of Illinois, Urbana-Champaign
 College of Engineering
 Urbana, IL 61801
 Prof. D.C. Drucker (217) 333-1000
 R.D. Field
 Programs:
 1. Structure of rapidly-solidified superalloy powders
49. Institute for Defense Analyses
 400 Army-Navy Drive
 Arlington, VA 22202
 T.F. Kearns (703) 558-1643
 Programs:
 1. An assessment of rapid solidification technology and its Department of Defense applications.
50. International Business Machines (IBM)
 T.J. Watson Research Center
 Yorktown Heights, NY 10598
 G.S. Cargill III
 Programs:
 1. Structure of amorphous metals
51. Johns Hopkins University
 Applied Physics Laboratory
 Johns Hopkins Road
 Laurel, MD 20810

- Dr. T.O. Poehler (301) 953-7100 x 2043
 K. Moorjani (301) 953-7100 x 7036
- Programs:
 1. Amorphous iron borides
52. Johns Hopkins University
 Materials Science Department
 Baltimore, MD 21218
 Prof. R.B. Pond, Sr. (301) 338-7125
- Programs:
 1. Chill block melt spinning
 2. Puddle melt extraction
53. Kaiser Aluminum & Chemical Corporation
 Center for Technology
 P.O. Box 877
 Pleasanton, CA 94566 (415) 462-1122
 T.R. Pritchett
 I. Broverman
 J.L. Dassel
 S.G. Roberts
- Programs:
 1. Aluminum alloy powder metallurgy
 2. Aluminum alloy solidification kinetics and structures
54. Lawrence Livermore National Laboratory
 P.O. Box 808
 Livermore, CA 94550 (415) 422-4892
 G. Dorrough
 B. Holt
 C. Cline
- Programs:
 1. Synthesis of amorphous, metastable crystalline, or supersaturated solid solutions of beryllium-containing alloys by rapid-quench techniques.
55. Lockheed California Company
 P.O. Box 551
 Burbank, CA 91520 (213) 847-3647
 R.F. Simenz
 Dept. Manager, Materials & Processes
 Lockheed California Company, Burbank, CA.
- Programs:
 1. System study, transport aircraft
 2. Supersonic cruise aircraft research
 3. High-temperature aluminum development
 4. Manufacturing methods for aluminum PM precision forgings
 5. Aluminum powder metallurgy alloys for superplastic forming

56. Lockheed-Georgia Company
 Dept. 72-77 Zone 450
 Marietta, GA 30063
 Dr. Walter S. Cremens (404) 424-4694
 William F. Bates, Jr. (404) 424-3902
 Programs:
 1. Evaluation of aluminum alloys and steels made by powder metallurgy from rapidly solidified powders.
57. Lockheed Palo Alto Research Laboratory
Lockheed Missiles and Space Company
 3251 Hanover Street
 Palo Alto, CA 94304
 R.E. Lewis (413) 493-4411 x 45743
 I.G. Palmer (415) 493-4411 x 45028
 Programs:
 1. Development of advanced aluminum alloys from rapidly solidified powders for aerospace structural applications
 2. Advanced aluminum alloys from rapidly solidified particulate
58. Los Alamos National Laboratory
Chemistry-Materials Science Division
 Los Alamos, NM 87545
 Dr. J.R. Cost (505) 667-2248
 Dr. R.O. Elliott (505) 667-4706
 Programs:
 1. Activation energies for atomic motion in Metglas alloys
 2. Irradiation-enhanced diffusion in metallic glasses
 3. Diffusion of hydrogen and/or helium in metallic glasses
 4. Effect of fission-fragment irradiation on SRO in a metallic glass
 5. Irradiation-induced amorphisation and development of prediction criteria for the process
59. M-Structures, Inc.
 Box 564, 299 Ridge Road
 Westminster, MD 21157
 Robert B. Pond, Jr. (301) 876-6801
 Programs:
 1. Vacuum die-cast alloy shaped charge liners
60. Marko Materials, Inc.
 144 Rangeway Road
 North Billerica, MA 01862
 Dr. Ranjan Ray (617) 663-2210
 Programs:
 1. Scale-up of a rapid solidification powder process
 2. Development of RSP iron-base alloys with high strength and/or high wear, oxidation- and/or corrosion-resistant properties

3. Development of RSP aluminum alloys for high-strength applications at elevated temperature
4. Development of RSP copper-base alloys with high strength and corrosion resistance.

61. Martin Marietta Laboratories
 1450 South Rolling Road
 Baltimore, MD 21227

Dr. Joseph R. Pickens

(301) 247-0700 x 373

Programs:

1. Stress-corrosion cracking and liquid metal embrittlement in rapidly solidified alloy, CT 91 (7091)
2. Stress corrosion in rapidly solidified alloys CT 91 and MR 61, compared with mechanically alloyed material, IN 9051.

62. MARVALAUD, INC.

P.O. Box 331

Westminster, MD 21157

Prof. Robert B. Pond, Sr.

(301) 876-2477

John Winter

Programs:

1. Chill block and free flight melt spinning process development
2. Puddle melt extraction process development
3. Development of processes producing rapidly solidified disintegrated metals and alloys
4. Investigation and exploitation of metal and alloy properties resulting from the operation of the above processes

63. Massachusetts Institute of Technology

77 Massachusetts Avenue

Cambridge, MA 02139

Prof. Morris Cohen

(616) 253-3324

Prof. Merton C. Flemings

(616) 253-3233(4)

Prof. Nicholas J. Grant

(616) 253-5637

Prof. Ronald Latanision

(616) 253-4697

Prof. Roy Kaplow

(616) 253-3322

Prof. Frederick J. McGarry

(616) 253-7172

Prof. Julian Szekely

(616) 253-3236

Prof. John B. Vander Sande

(616) 253-6933

Prof. Gregory Yurek

(616) 253-3239

Prof. Kenneth Russell

(616) 253-3328

Programs:

1. Deformation and fracture behavior of rapidly solidified carbide dispersion strengthened superalloys at high temperatures (Grant)
2. Crack initiation and growth in high-temperature superalloys under high-temperature creep conditions (Grant)

3. Superplastic deformation of mixed alpha-gamma stainless steels prepared from rapidly quenched particulates (Grant)
4. The mechanical behavior of metallic glasses (Grant)
5. The role of alloying on the stability and properties of Pd-Si glasses (Grant)
6. The properties of Ni₆₀-Nb₄₀ glasses (Grant)
7. Structure and properties of lithium-alloyed 2024 and Al-Mg-Li/type aluminum alloys prepared from rapidly solidified particulates (Grant)
8. The structure and properties of aluminum alloy 2020 + Li produced by rapid solidification from the melt (Grant)
9. The potential for oxide-dispersed, rapidly solidified, fine-grained ultrasonically atomized aluminum alloys for high-temperature service (Grant)
10. Oxide-dispersed type 316 stainless steels produced from rapidly quenched fine powders (Grant)
11. Type 316 stainless steels prepared from rapidly quenched particulates as first wall fusion reactor materials (Grant)
12. The structure and properties of rapidly solidified, titanium-modified 316 stainless steel first wall fusion reactor alloy (Grant)
13. High-strength, high-temperature, high-thermal-conductivity copper-base alloys (Grant)
14. The structure and properties of high-thermal-conductivity, high-temperature, high-strength, copper-based alloys produced by rapid solidification (Grant)
15. The crystallization and consolidation of high glass transition temperature metallic glasses (Grant)
16. Preliminary work on ion irradiation of first wall materials (Russell)
17. Rapidly solidified Ti-modified 316 stainless steels for irradiation environments (Grant, Vander Sande)
18. Study of void nucleation under irradiation with continuous helium generation (Russell)
19. Chemical stability of metallic glasses (Latanision)
20. Hydrogen permeation and embrittlement in metallic glasses (Latanision)
21. Structure of amorphous and semi-crystalline polymers (Vander Sande)
22. Oxidation resistance of rapidly solidified austenitic steels (Yurek)
23. Ultra-rapid solidification (Flemings)
24. Rapid solidification of magnesium (Flemings)
25. Undercooling, structure, and rapid solidification (Flemings)
26. Mathematical modelling of rapid quenching techniques (Szekely)
27. Rapid solidification of thermoplastics (McGarry)

28. Crystallization of Fe-B glasses (Kaplow)
 29. STEM microanalysis of rapidly solidified steels (Cohen, Vander Sande)
 30. Grain growth behavior of rapidly solidified steels (Cohen Vander Sande)
 31. Fracture toughness of rapidly solidified steels (Cohen)
 32. Tempering behavior of rapidly solidified martensitic steels (Cohen, Vander Sande)
 33. Physical metallurgy of RSP microalloyed steels (Vander Sande, Cohen)
 34. Oxidation resistance of RSP austenitic steels (Yurek)
64. McDonnell-Douglas Research Laboratories
P.O. Box 512
St. Louis, MO 63166
D.P. Ames (314) 232-3254
Programs:
1. Evaluation of RST alloys
65. McGill University
Ernest Rutherford Physics Building
3600 University Street
Montreal, PQ
Canada, H3A 2T8
Prof. J.O. Strom-Olsen (514) 392-4419
Prof. W.B. Muir (514) 392-4786
Prof. R. Harris (514) 392-4407
Prof. M. Zuckermann (514) 392-4787
Dr. Z. Altounian (514) 392-4412
Programs:
1. Stability of melt-spun amorphous metals.
2. Electron transport properties of amorphous metals, especially at low temperatures
3. Magnetic properties (including Mossbauer effect) of amorphous magnetic alloys
4. Structural modelling of amorphous systems
66. Michigan Technological University
Department of Metallurgical Engineering
Houghton, MI 49931
Prof. T.H. Courtney (906) 487-2036
Prof. R.W. Heckel (906) 487-2010
Prof. D.A. Koss (906) 487-2170
Prof. D.W. Smith (906) 487-2037
Programs:
1. Structure-property relationships in powder-fabricated metals and alloys (several programs)
2. Powder fabrication of alloys via homogenization processing (several alloy systems)

3. Fatigue and fracture phenomena in high-performance powder-fabricated alloys (to begin in the near future)
 4. High-temperature oxidation and oxidation-resistant coatings (superalloys)
67. NASA Langley Research Center
 Materials Division
 Structures Directorate
 Hampton, VA 23665
 B. Lisgor (804) 827-1110 x 3386
 Programs:
 1. Powder metallurgy aluminum alloys for structural application
 2. Thermo-mechanical processing of PM aluminum alloys
68. NASA Lewis Research Center
 Materials Division
 Cleveland, OH 44135
 H.B. Probst (216) 433-4000 x 6392
 Programs:
 1. Physical metallurgy of innovative alloy systems
 2. Evaluation of RST alloys in iron- and nickel-based systems
69. National Bureau of Standards (DOC)
 Materials Bldg.
 Washington, DC 20234
 Dr. J. Wachtman, Jr. Rm. B 308 (301) 921-2981
 Dr. R. R. Mehrabian Rm. B 266 (301) 921-2811
 Dr. J.W. Cahn Rm. A 153
 Programs:
 1. Production of well-characterized powders
 2. Characterization of rapidly solidified powders
 3. Phase diagrams of interest in RST
 4. Thermodynamics of solidification
70. Naval Air Development Center
 Aero Materials Laboratory (6063)
 Jacksonville and Street Roads
 Warminster, PA 18974
 Dr. G.J. London (215) 441-2808
 R.G. Mahorter (215) 441-2809
 Programs:
 1. Evaluation of RST alloys
71. Naval Research Laboratory
 4555 Overlook Avenue, S.W.
 Washington, DC 20375
 Dr. B. Rath (Code 6490) (202) 767-2465
 Programs:
 1. Acoustic damping alloys
 2. Wear-, corrosion-, erosion-resistant alloys

3. Superconducting composites

72. David Taylor Naval Ship Research & Development Center
Ship Materials Engineering Department

Annapolis, MD 21402

J.R. Belt (301) 267-2635

J.R. Crisci (301) 267-2462

B. Hammond (301) 267-3655

Programs:

1. Rapidly solidified alloys for corrosion resistance of machinery alloys

73. Naval Surface Weapons Center
R-32, Metallic Materials Branch

White Oak, MD 20910

A.P. Divecha (202) 394-2019

H. Dejarnette

Dr. L. Kabacoff

S.D. Karmakar

Programs:

1. Al-Li ingots via rapid crystallization under pressure
2. Al-Mg ingots via rapid crystallization under pressure
3. SiC whisker and SiC particle-reinforced aluminum alloy flakes and sheets via rapid-solidification and deformation processing
4. Amorphous ribbons via rapid solidification for magnetostrictive alloys

74. North Carolina State University

Raleigh, NC 27650

R.B. Benson, Jr. (919) 737-2377

P.A. Parrish

1. Enhanced corrosion resistance of metal surfaces by ion treatment

75. Northeastern University
Institute of Chemical Analysis

360 Huntington Avenue

Boston, MA 02115

Prof. B.C. Giessen (617) 437-2827

Programs:

1. Preparation and characterization of new metallic glasses
2. Production and consolidation of experimental quantities of RST powders

76. Northrop Corporation
Aircraft Division (Dept. 3871/62)

3901 West Broadway

Hawthorne, CA 90250

Dr. G.R. Chanani (213) 970-4963

I. Telesman

Programs:

1. Development and processing of aluminum-lithium-based alloys using both rapid-solidification and ingot technology
2. Investigation of high-strength fatigue resistant P/M 7XXX and 2XXX aluminum alloys
3. Investigation of improved methods for consolidating rapidly solidified aluminum alloy powders
4. High-strength P/M aluminum mill products
5. Manufacturing process for the hot isostatic pressing of large titanium P/M shapes

77. Northwest Technical Industries, Inc.

547 Diamond Point Road
Sequim, WA 93882

Joseph R. Munn

(206) 683-4167

Alan W. Hare

Programs:

1. Explosive compaction of rapidly solidified elemental and alloy (steel and aluminum) powders

78. Norton Company

Industrial Ceramics Division

1 New Bond Street

Worcester, MA 01606

M.L. Torti

(617) 853-1000 x2092

Research Manager

Programs:

1. Technology monitoring in ceramics systems

79. Nuclear Metals Inc.

2229 Main Street

Concord, MA 01742

P. Loewenstein

(617) 369-5410

Vice President & Technical Director

P.R. Roberts

Engineering Manager for Specialty Powders

Programs:

1. Production of powders of most metals and alloys by the rotating electrode process
2. Consolidation of powders by extrusion

80. Oak Ridge National Laboratory (DOE)

Metals and Ceramics Division

P.O. Box X

Oak Ridge, TN 37830

J.R. Weir, Jr.

(615) 574-4065

C.C. Koch

A. Das Gupta

D.S. Easton

D.M. Kroeger

Programs:

1. Amorphous superconductors
2. Stability of binary and ternary metallic glasses
3. Preparation of amorphous materials by arc-hammer, melt spinning, and electron-beam vapor deposition

81. Oak Ridge National Laboratory

Solid State Division,

P.O. Box X

Oak Ridge, TN 37830

C.W. White

(615) 574-6295

B.R. Appleton

(615) 574-6283

Programs:

1. Pulsed laser annealing of ion-implanted materials
2. Non-equilibrium crystal growth phenomena
3. Ultra-rapid heating and cooling using Q-switched and mode-locked laser sources
4. Formation of supersaturated solid solutions by ion implantation and laser annealing
5. Metastable surface properties resulting from rapid solidification

82. Ohio State University

Metallurgical Engineering Department

Columbus, OH 43220

Prof. G.W. Powell

(614) 422-6608

Prof. J.P. Hirth

Programs:

1. Mechanical properties of rapidly solidified powders of Fe-Al-Si alloys after compaction and extrusion
2. Oxidation resistance of rapidly solidified powders of Fe-Al-Si alloys after compaction and extrusion

83. Oregon Graduate Center

Department of Materials Science

19600 N.W. Walker Road

Beaverton, OR 97005

Dr. W.E. Wood

(503) 645-1121

Programs:

1. Laser alloying of Fe surfaces
2. Analysis of microstructure and strengthening mechanisms

84. University of Pennsylvania

Department of Metallurgy

Philadelphia, PA 19104

Prof. T. Egami

(215) 243-5000

Prof. W.R. Graham

Programs:

1. Research on RST alloys

85. The Pennsylvania State University
 Materials Research Laboratory
 University Park, PA 16802
 R. Messier (814) 865-3704
 N.H. Macmillan (814) 863-0190
 R. Roy (814) 865-3421
 S.V. Krishnaswamy (814) 865-3704
 Programs:
 1. Explosive crystallization of tetrahedrally bonded amorphous semi-conductor films
 2. Laser treatment of ceramics
 3. Plasma-sprayed layers
86. Phrasor Scientific, Inc.
 1536 Highland Avenue
 Duarte, CA 91010
 J.F. Mahoney (213) 357-3201
 Dr. Julius Perel
 1. Development of a table top fine powder generator and film coater for materials science investigations
87. University of Pittsburgh
 Department of Metallurgy and Materials
 Pittsburgh, PA 15260
 Prof. F.S. Pettit (412) 624-4141
 Programs:
 1. Basic research in rapidly solidified alloys
88. Polytechnic Institute of New York
 Microwave Research Institute
 Route 110
 Farmingdale, NY 11735
 Prof. W.T. Walter (516) 694-5500
 Prof. M. Newstein
 Dr. N. Solimene
 Programs:
 1. Reflectance changes of metals and semiconductors during laser irradiation
 2. Laser interaction with metallic surfaces
 3. Optical properties of metals during laser irradiation
 4. High-power electromagnetic wave interaction with matter
 5. Laser annealing of semiconductors
89. Pratt and Whitney Aircraft Group
 Commercial Products Division
 400 Main Street
 East Hartford, CT 06108
 Dr. M. Blackburn (203) 565-3185
 C.C. Law (203) 344-5092
 D.F. Paulonis (203) 565-4667

Programs:

1. Evaluation of RST alloys
2. Advanced high-temperature aluminum alloys development

90. Pratt and Whitney Aircraft Group

Government Products Division

P.O. Box 2691

West Palm Beach, FL 33402

Arthur R. Cox

(305) 840-3234

Programs:

1. Solidification theory
2. Process development for rapid solidification
3. Metal working relationship to rapid solidification powders
4. Rapid solidification as a means to reduce strategic element usage
5. Rapid solidification alloys for jet engine turbine blades and vanes
6. Rapid solidification alloys for jet engine turbine discs
7. Rapid solidification of alloys for jet engine bearings
8. Rapid solidification aluminum alloy development
9. Rapid solidification high strength steel development
10. Rapid solidification corrosion-resistant steel development
11. Rapid solidification development for special-purpose steels and Ni alloys
12. Rapid solidification effects on corrosion of super-alloys

91. Purdue University

Department of Materials Engineering

Lafayette, IN 47907

Prof. J. Radavich

(317) 749-8111

Programs:

1. Research in RST alloys

92. Rensselaer Polytechnic Institute

Materials Engineering Department

Troy, NY 12181

Prof. M.E. Glicksman

(518) 270-6372

Programs:

1. Solute redistribution during rapid solidification: fundamental studies of how rapid solidification influences microsegregation and homogeneity
2. Dendritic growth--kinetics and micromorphology: studies relating dendritic structures to processing variables--especially cooling rate, supercooling, branch spacing, growth speed--to materials parameters and alloy characteristics

93. Revere Research, Inc.
P.O. Box 1352
Edison, NJ
Dr. S. Shapiro (201) 225-2000
Programs:
1. High-pressure extrusion of powders
94. Reynolds Metals Company
Metallurgical Research Division
P.O. Box 27003
Richmond, VA 23226
B.F. Holcombe, Jr. (804) 788-7563
DOD Contracts
Dr. D.S. Thompson (804) 788-7404
Director Dept. Metallurgy
O.R. (Duke) Singleton (804) 788-7462
Program Manager, #1 below
Programs:
1. Manufacturing technology: high-strength, powder metallurgy mill products
2. Dispersion hardened P/M alloys
3. Aluminum matrix, P/M composites
4. Improved P/M billet production techniques
95. University of Rochester
Department of Mechanical and Aerospace Sciences
Rochester, NY 14627
Dr. J.C. Li (716) 275-4038
Programs:
1. Mechanical properties of amorphous metals
96. Rocketdyne
Division of Rockwell International
6633 Canoga Avenue Mail Stop DA-92
Canoga Park, CA 91304
C.M. Moss (213) 884-3527
J.R. Lewis (213) 884-3527
Programs:
1. Injection-molding and sintering of rapidly solidified nickel-base superalloy powders
97. Rockwell International
Rocky Flats Plant
P.O. Box 464
Golden, CO 80401
R.R. Corle (303) 497-2577
Ms. C.L. Ferrera (303) 497-2148
Programs:
1. Rapid solidification of beryllium

98. Rockwell International Science Center
 1049 Camino Dos Rios
 Thousand Oaks, CA 91360
 M. Mitchell (805) 498-4545 x 343
 D. Gnanamuthu
 Programs:
 1. Properties of materials produced by rapid solidification technology
 2. Laser processing of materials using rapid solidification technology
99. SCM Corporation
 11000 Cedar Avenue
 Cleveland, OH 44106
 C.I. Whitman/Director R&D (216) 344-8446
 E. Klar/Manager-Particle Tech (216) 344-8496
 K. Kulkarni/Manager-Ferrous Full (216) 344-8445
 Dense Materials
 Programs:
 1. Metallurgical structure control in atomization and consolidation
100. Sandia National Laboratories
 P.O. Box 5800
 Albuquerque, NM 87185
 S. Thomas Picraux (505) 844-7681
 Paul S. Peercy (505) 844-6076
 Programs:
 1. Pulsed electron beam annealing of metals and semiconductors
 2. Swept line electron beam annealing of metals and semiconductors
 3. Pulsed laser annealing of metals and semiconductors
101. Sandia National Laboratories
 Materials Development Division 8312
 Livermore, CA 94550
 Dr. J.E. Smugeresky (415) 422-2910 x2476
 Programs:
 1. Evaluation of rapid solidification powder-making processes for J8K-75 and A-286
 2. Effect of powder characteristics and consolidation parameters on the microstructure and properties of rapidly solidified steels
 3. Characteristics of gas atomized Nitronic 40 stainless steel as a function of atomizing gas
 4. Effect of composition and powder-making process on the properties of rapidly solidified powder processed maraging steels
 5. Evaluation of rapid solidification processes for the production of powders of Incoloy 903

6. Hot isostatic pressing of rapidly solidified HP-9-4-20 steel powders
102. Sikorsky Aircraft
Transmission System Section
Stratford, CT 06602
J.G. Kish (203) 386-5391
Programs:
 1. High-performance gears
103. University of Southern California
3551 University Avenue
Los Angeles, CA 90007
Prof. S.M. Copley (213) 741-6225
Dept. of Materials Science
Dr. M. Bass (213) 741-7994
Dept. of Physics
Programs:
 1. Solidification of metallic melts produced by laser irradiation
104. Special Metals Corporation
Middle Settlement Road
New Hartford, NY 13413
J.W. Pridgeon (315) 798-2930
L.A. Jackman
W.J. Boesch
Programs:
 1. Fine-grain ingots by vacuum arc remelting
 2. Development of powder-making processes
 3. Structure of rapidly solidified superalloys
105. Stanford University
Dept. of Materials-Science and Engineering
Stanford, CA 94305
Prof. O.D. Sherby (415) 497-2300
Programs:
 1. Specialty steels
106. Systems Research Laboratories, Inc.
2800 Indian Ripple Road
Dayton, OH 45440
R.E. Omlor
Programs:
 1. Characterization of powders and foils
107. University of Toronto
Dept. of Metallurgy and Materials Science
Toronto, ON M5S 1A4,
Canada

Prof. Y. Waseda
Prof. K.T. Aust

(416) 978-3012

Programs:

1. Structure of rapidly quenched metals by x-ray and neutron diffraction
2. Chemical properties such as corrosion behavior of metallic glasses

108. TRW Equipment Group

TRW Incorporated
23555 Euclid Avenue
Cleveland, OH 44117
John A. Alexander

(216) 383-3292

Programs:

1. Processing evaluation of RST alloys

109. United Technologies Research Center

Silver Lane
East Hartford, CT 06108
Dr. E.R. Thompson

(203) 727-7344

Programs:

1. Laser and layerglaze processing and pertinent alloy development
2. Dynamic compaction of rapidly solidified alloys
3. Alloys for rapid solidification processing and consolidation techniques

110. Universal-Cyclops Specialty Steel Division

Research and Development Department
Mayer Street
Bridgeville, PA 15017

L.W. Lherbier

(412) 221-8000 x 300

W.B. Kent

(412) 221-8000 x 343

J.T. Cordy

(412) 221-8000 x 366

Programs:

1. Rapidly solidified powder via gas atomization
2. Controlled rate solidification of specialty steel billets

111. Valimet, Inc.

P.O. Box 6186
431 Sperry Road
Stockton, CA 95206

William K. Fortman, Pres.

(209) 982-4870

Terry S. Ullman, Mgr. Special Alloys

Programs:

1. Helium-gas-atomized powder production

112. University of Virginia
Department of Materials Science
Thornton Hall
Charlottesville, VA 22901
Dr. L.B. Johnson, Jr. (804) 924-3264
Programs:
1. Dental materials applications
113. Western Electric Engineering Research Center
Laser Studies Group
P.O. Box 900
Princeton, NJ 08540
Dr. C.W. Draper (609) 639-2527
Programs:
1. The use of laser quenching of conventional alloys
(mostly Cu-based) to produce metastable single-phase
surfaces
2. The use of laser surface alloying to produce novel
compositions in metals
3. Studies of the damage induced in single crystal metals
by laser irradiation
4. Determination of the effects of items 1 through 3 on
the surface sensitive behavior of metals
5. Studies of the redistribution of ion implants in metals
by laser irradiation treatments
114. Westinghouse Electric Corp., R&D Center
1310 Beulah Road
Pittsburgh, PA 15235
Dr. F.E. Werner (412) 256-3556
Programs:
1. Evaluation of Allied Corp METGLAS alloys for 60 Hz
transformers
2. Basic studies of crystallization and other phenomena
115. Univeristy of Wisconsin-Madison
Madison, WI 53706
J.H. Perepezko (608) 263-1678
Programs:
1. Solidification of highly undercooled liquid droplets

SECTION II. RESEARCH AND DEVELOPMENT SPONSORS

- 1S Air Force Wright Aeronautical Laboratories
Flight Dynamics Laboratory
Wright Patterson AFB
OH 45433
F. Boensch (FIBAA) (513) 255-5006
L.G. Kelly (FIBC) (513) 255-4030
- 2S Air Force Wright Aeronautical Laboratories
Materials Laboratory
Wright Patterson AFB
OH 45433
Dr. H. Burte (/MLL) (513) 255-5348
G. Eichelman (/MLLS) (513) 255-3839
- 3S Air Force Wright Aeronautical Laboratories
Propulsion Laboratory
Wright Patterson AFB
OH 45433
R.E. Supp, (/PO) (513) 255-5334
- 4S Air Force Office of Scientific
Research/NE
Bolling Air Force Base
Washington, DC 20332
Dr. A.R. Rosenstein (202) 767-4931
- 5S Army Armament R&D Command
AARADCOM
Dover, NJ 07801
Dr. J. Waldman (201) 328-5111
Dr. S.J. Cytron (201) 328-5746
- 6S Army Materials and Mechanics
Research Center
Watertown, MA 02172
Dr. G.H. Bishop, Jr. (617) 923-3436
Dr. S. Isserow, DSXMP-KA (617) 923-3504
- 7S Army Mobility Equipment R&D Command
MERADCOM
Fort Belvoir, VA 22060
W.F. McGovern (703) 664-5459

- 8S Army Research Office
P.O. Box 12211
Research Triangle Park
NC 27709
Dr. G. Mayer (919) 549-0641
- 9S Defense Advanced Research
Projects Agency
1400 Wilson Blvd.
Arlington, VA 22209
Dr. E. Van Reuth (202) 694-4750
Lt. Col. L. Jacobson, USAF (202) 694-1346
- 10S Department of Energy
Division of Materials Sciences
Washington, DC 20545
Dr. D. Stevens (ER-13) (303) 353-3427
- 11S Electric Power Research Institute
3412 Hillview Avenue
Palo Alto, CA 94304
E. Norton (415) 855-2282
- 12S Department of Interior
Bureau of Mines
Mineral Resources Technology
Division
2401 E. Street, N.W.
Washington, DC 20241
K.W. Mlynarski (202) 634-1138
- 13S NASA Headquarters
600 Independence Avenue, N.W.
Washington, DC 20543
Dr. M. Greenfield (TRM) (202) 755-2365
- 14S NASA Langley Research Center
Materials Division
Structures Directorate
Hampton, VA 23665
B. Lisgor (804) 827-1110 x3386
- 15S NASA Lewis Research Center
Materials Division
Cleveland, OH 44135
H.B. Probst (216) 433-4000 x6392
- 16S National Science Foundation
Division of Materials Research
1800 G. Street, N.W.
Washington, DC 20550
Dr. R. Reznik (202) 357-9789

17S	<u>Naval Air Systems Command</u> Washington, DC 20361 R. Schmidt (AIR-320)	(202) 692-2515
18S	<u>Office of Naval Research</u> 800 N. Quincy Street Arlington, VA 22217 Dr. D. Polk (471)	(202) 696-4402
19S	<u>Naval Research Laboratory</u> 4555 Overlook Avenue, S.W. Washington, DC 20375 Dr. B. Rath (6490)	(202) 767-2465
20S	<u>Naval Sea Systems Command</u> Washington, DC 20362 Dr. H. Van der Veldt (SEA-05R15) M. Kinna (SEA-62R4)	(202) 697-2432 (202) 692-1685
21S	<u>Naval Surface Weapons Center</u> White Oak Silver Spring, MD 20910 Dr. S. Fishman (R-32)	(202) 394-2724

SECTION III. NAME INDEX

Adler, R.P.I., GTE Laboratories, Inc. (43)
Ahmad, I., Army Armament R&D Command (11)
Ahrens, T.J., California Institute of Technology (24)
Alexander, J.A., TRW Incorporated (108)
Altounian, Z., McGill University (65)
Ames, D.P., McDonnell-Douglas Research Labs. (64)
Appleton, B.R., Oak Ridge National Lab. (81)
Arajs, S., Clarkson College of Technology (27)
Ashcroft, N.W., Cornell University (31)
Ast, D.G., Cornell University (31)
Aust, K.T., University of Toronto (107)
Baer, D.R. Battelle Pacific NW Lab. (16)
Bania, P.J., Avco Lycoming Division (14)
Barranco, J., Army Armament R&D Command (11)
Bass, M., University of Southern California (103)
Bates, W.F., Jr., Lockheed Georgia Co. (56)
Belt, R., David Taylor Naval Ship R&D Center (72)
Benson, R.B., Jr., North Carolina State University (74)
Billman, F.R., Alcoa Laboratories (4)
Bishop, G.H., Jr., Army Materials & Mechanics Research Center (6S)
Blackburn, M., Pratt and Whitney Aircraft Group (89)
Boensch, F.D., Air Force Wright Aero Labs. (1, 1S)
Boesch, W.J., Special Metals Corporation (104)
Bramfitt, B.L., Bethlehem Steel Corporation (18)
Broverman, I., Kaiser Aluminum & Chemical Corp. (53)
Burte, H., Air Force Wright Aero Labs. (2,2S)

Cahn, J.W., National Bureau of Standards (69)
 Carbonara, R.S., Battelle Columbus Laboratories (15)
 Cargill, G.S. III, International Business Machines (50)
 Caton, R., Clarkson College of Technology (27)
 Cebulak, W.S., Alcoa Laboratories (4)
 Cline, C., Lawrence Livermore National Lab. (54)
 Chanani, G.R., Northrop Corporation (76)
 Chen, W.C., Ames Laboratory (5)
 Chilton, J.M., Bethlehem Steel Corporation (18)
 Cohen, M., Massachusetts Institute of Technology (63)
 Copley, S.M., University of Southern California (103)
 Cordy, J.T., Universal Cyclops Specialty Steel Division (110)
 Corle, R.R., Rockwell International (97)
 Cost, J.R., Los Alamos National Lab. (58)
 Courtney, T.H., Michigan Technological University (66)
 Cox, A.R., Pratt & Whitney Aircraft Group (90)
 Cremens, W.S., Lockheed Georgia Company (56)
 Crisci, J.R., D.T. Naval Ship R&D Center (72)
 Cytron, S.J., Army Armament R&D Command (10, 5S)
 Dahlgren, S.D., Battelle Pacific NW Lab. (16)
 Dardi, L.L., Howmet Turbine Components Corporation (47)
 Das, K.B., The Boeing Company (19)
 Das Gupta, A., Oak Ridge National Lab. (80)
 Dassel, J.L., Kaiser Aluminum & Chemical Corp. (53)
 Davis, L.A., Allied Chemical Corporation (3)
 Decristofaro, N.J., Allied Chemical Corporation (3)
 Dejarnette, H., Naval Surface Weapons Center (73)
 Dickson, J., Allied Chemical Corporation (3)
 Divecha, A.P., Naval Surface Weapons Center (73)
 Dolowy, J.F., Jr., DWA Composite Specialties, Inc. (35)
 Dorough, G., Lawrence Livermore National Lab. (54)
 Dowagala, R., Argonne National Laboratory (6)
 Draper, C.W. Western Electric Engineering Research Center (113)
 Drucker, D.C., University of Illinois (48)

Dulis, E.J., Crucible Research Center (32)
 Easton, D.S., Oak Ridge National Lab. (80)
 Egami, T., University of Pennsylvania (84)
 Eichelman, G., Air Force Wright Aero Labs. (2, 2S)
 Elliott, R.O., Los Alamos National Lab. (58)
 Ferrera, C.L., Rockwell International (97)
 Fiedler, L.J., Avco Lycoming Division (14)
 Field, R.D., University of Illinois (48)
 Fishman, S., Naval Surface Weapons Center (21S)
 Flemings, M.C., Massachusetts Institute of Technology (63)
 Fortman, W.K., Valimet Inc. (111)
 Fox, C.W., Homogeneous Metals, Inc. (46)
 Freeman, W.R., Jr. Howmet Turbine Components Corporation (47)
 Giessen, B.C., Northeastern University (75)
 Glicksman, M.E., Rensselaer Polytechnic Institute (92)
 Gnanamuthu, D., Rockwell International (98)
 Gould, R.W., University of Florida (37)
 Graham, H., Air Force Wright Aero Labs. (2)
 Graham, W.R., University of Pennsylvania (84)
 Grant, N.J., Massachusetts Institute of Technology (63)
 Green, M.L., Bell Telephone Laboratories (17)
 Greenfield, M., NASA Headquarters (13S)
 Hammond, B., D.T. Naval Ship R&D Center (72)
 Hansen, R.S., Ames Laboratory (5)
 Hare, A.W., Northwest Technical Industries, Inc. (77)
 Harrigan, W.C., DWA Composite Specialties, Inc. (35)
 Harris, R., McGill University (65)
 Heckel, R.W., Michigan Technological University (66)
 Hickl, A.J., Cabot Corporation (22)
 Hirth, J.P., Ohio State University (82)
 Holcombe, B.F., Jr., Reynolds Metals Company (94)
 Holt, B., Lawrence Livermore National Lab. (54)
 Hood, P.E., Exxon Enterprises (36)
 Hsu, S.C., GTE Laboratories, Inc. (43)

Isserow, S., Army Materials & Mechanics Research Center (12, 6S)
 Jackman, L.A., Special Metals Corporation (104)
 Jackson, K.A., Bell Telephone Laboratories (17)
 Jacobson, L., Defense Adv. Research Project Agency (9S)
 Jeanfils, C.L., Cabot Corporation (22)
 Jing gu Zhang, Univeristy of Connecticut (30)
 Johnson, A.M., General Electric, Co. (39)
 Johnson, H.H., Cornell University (31)
 Johnson, L.A., General Electric, Company (40)
 Johnson, L.B. Jr., University of Virginia (112)
 Johnson, W.L., California Institute of Technology (24)
 Kabacoff, L., Naval Surface Weapons Center (73)
 Kaplow, R., Massachusetts Institute of Technology (63)
 Karmaker, S.D., Naval Surface Weapons Center (73)
 Kear, B.H., University of Connecticut/UTRC (30, 109)
 Kearns, T.F., Institute for Defense Analyses (49)
 Kelly, L.G., Air Force Wright Aero Labs (1, 1S)
 Kent, W.B., Universal Cyclops Specialty Steel Division (110)
 Kinna, M., Naval Sea Systems Command (20S)
 Kish, J.G., Sikorsky Aircraft (102)
 Klar, E., SCM Corporation (99)
 Koch, C.C., Oak Ridge National Lab. (80)
 Koffman, D.M., GTE Laboratories Inc. (43)
 Koss, D.A., Michigan Technological University (66)
 Krishnaswamy, S.V., Pennsylvania State University (85)
 Kroeger, D.M., Oak Ridge National Lab. (80)
 Kulkarni, K., SCM Corporation (99)
 Kumar, M., Army Armament R&D Command (9)
 Kurup, M., University of Connecticut (30)
 Kushnick, J.H., Allied Chemical Corporation (3)
 Lane, J.M., Army Applied Technology Lab. (8)
 Latanision, R.M., Massachusetts Institute of Technology (63)
 Law, C.C., Pratt & Whitney Aircraft Group (89)
 Lawley, A., Drexel University (34)

Lewis, B.G., University of Connecticut (30)
 Lewis, J.R., Rocketdyne (96)
 Lewis, R.E., Lockheed Palo Alto Research Lab. (57)
 Lherbier, L.W., Universal Cyclops Specialty Steel Division (110)
 Li, J.C., University of Rochester (95)
 Lieberman, H.H., General Electric Company (40)
 Liebert, B.E., University of Hawaii (45)
 Lisgor, B., NASA Langley Research Center (67, 14S)
 London, G.J., Naval Air Development Center (70)
 Lowenstein, P., Nuclear Metals, Inc. (79)
 Macmillan, N.H., Pennsylvania State University (85)
 Mahoney, J.F., Phrasor Scientific, Inc. (86)
 Mahorter, R.G., Naval Air Development Center (70)
 Maniar, G.N., Carpenter Technology Corporation (26)
 Maringer, R.E., Battelle Columbus Laboratories (15)
 Mayer, G., Army Research Office (8S)
 Mayer, J., California Institute of Technology (24)
 McCall, J.L., Battelle Columbus Laboratories (15)
 McGarry, F.J., Massachusetts Institute of Technology (63)
 McGovern, W.F., Army Mobility Equipment R&D Com. (13, 7S)
 Mehrabian, R.R., National Bureau of Standards (69)
 Merz, M.D., Battelle Pacific N.W. Labs. (16)
 Messier, R., Pennsylvania State University (85)
 Millan, P.P., Jr., Garrett Turbine Engine Company (38)
 Mitchell, M., Rockwell International (98)
 Mlynarski, K.W., Bureau of Mines (21, 12S)
 Moll, J.H., Crucible Research Center (32)
 Moorjani, K., Johns Hopkins University (51)
 Moss, C.M., Rocketdyne (96)
 Muir, W.B., McGill University (65)
 Munn, J.R., Northwest Technical Industries, Inc. (77)
 Muzyka, D.R., Carpenter Technology Corporation (26)
 Naranayan, G.H., The Boeing Company (19)
 Newstein, M., Polytechnic Institute of New York (88)

Norton, Electric Power Res. Inst. (11S)
 Omlor, R.E., Systems Research Labs. Inc. (106)
 Onn, D.G., University of Delaware (33)
 Otooni, M., Army Armament R&D Command (10)
 Palmer, I.G., Lockheed Palo Alto Research Lab. (57)
 Paris, H.G., Alcoa Laboratories (4)
 Parrish, P.A., North Carolina State University (74)
 Patten, J.W., Battelle Pacific NW Lab. (16)
 Paulonis, D.F., Pratt and Whitney Aircraft Group (89)
 Pawlewicz, W.T., Battelle Pacific NW Lab. (16)
 Peercy, P.S., Sandia National Laboratories (100)
 Perel, J., Phrasor Scientific, Inc. (86)
 Perepezko, J.H., University of Wisconsin (115)
 Pettit, F.S., University of Pittsburgh (87)
 Pickens, J.O., Exxon Enterprises (36)
 Pickens J.R., Martin Marietta Labs. (61)
 Picraux, S.T., Sandia National Laboratories (100)
 Poehler T.O., Johns Hopkins University (51)
 Polk, D., Office of Naval Research (18S)
 Pond, R.B., Sr., Johns Hopkins University (52, 62)
 Pond, R.B., Jr., Mm-Structures, Inc. (59)
 Powell, G.W., Ohio State University (82)
 Prater, J.T., Battelle Pacific NW Lab. (16)
 Pridgeon, J.W., Special Metals Corporation (104)
 Prinz, F., Carnegie-Mellon University (25)
 Pritchett, T.R., Kaiser Aluminum and Chemical Corp. (53)
 Probst, H.B., NASA Lewis Research Center (68, 15S)
 Quist, W.E., The Boeing Company (19)
 Radavich, J., Purdue University (91)
 Rath, B., Naval Research Laboratory (71, 19S)
 Ray, R., Marko Materials Inc. (60)
 Reynick, R., National Science Foundation (16S)
 Ro, D.H., Gould Laboratories (42)
 Roberts, P.R., Nuclear Metals, Inc. (79)

Roberts, S.G., Kaiser Aluminum & Chemical Corp. (53)
 Rosenstein, A.R., USAF Office of Scientific Research (4S)
 Rowe, R.G., General Electric Company (40)
 Roy, R., Pennsylvania State University (85)
 Russell, K., Massachusetts Institute of Technology (63)
 Sanders, T.H., Georgia Institute of Technology (41)
 Schmidt, R., Naval Air Systems Command (17S)
 Sekerka, R.G., Carnegie Mellon University (25)
 Semchyshen, M., Climax Molybdenum Company (28)
 Shapiro, S., Revere Research Inc. (93)
 Sherby, O.D., Stanford University (105)
 Simenz, R.F., Lockheed California Company (55)
 Singleton, O.R., Reynolds Metals Company (94)
 Smith, D.W., Michigan Technological University (66)
 Smugeresky, J.E., Sandia National Labs (101)
 Solimene, N., Polytechnic Institute of New York (88)
 Starke, E.A., Jr., Georgia Institute of Technology (41)
 Stevens, D., Department of Energy (10S)
 Strangman, T.E., Garrett Turbine Engine Company (38)
 Strom-Olsen, J.O., McGill University (65)
 Strutt, P.R., University of Connecticut (30)
 Supan, E.C., DWA Composite Specialties, Inc. (35)
 Supp, R.E., Air Force Wright Aero Labs. (3S)
 Szekely, J., Massachusetts Institute of Technology (63)
 Tauc, J., Brown University (20)
 Telesman, I., Northrop Corporation (76)
 Thompson, D.S., Reynolds Metals Company (94)
 Thompson, E.R., United Technologies Research Center (109)
 Tien, J.K., Columbia University (29)
 Torti, M.L., Norton Company (78)
 Townsend, H.E., Bethlehem Steel Corporation (18)
 Turnbull, D., Harvard University (44)
 Ullman, T.S., Valimet, Inc. (111)
 Vander Sande, J.B., Massachusetts Institute of Technology (63)

Van der Veldt, H., Naval Sea Systems, Command (20S)
Van Reuth, E., Defense Advance Research Project Agency (9S)
Voss, D., Air Force Wright Aero Labs. (2)
Vreeland, T., Jr., California Institute of Technology (24)
Wachtman, J., Jr., National Bureau of Standards (69)
Wagner, C.N.J., University of California at Los Angeles (23)
Waldman, J., Army Armament R&D Command (9, 5S)
Walter, W.T., Polytechnic Institute of New York (88)
Ward, C.E., Armco, Inc. (7)
Waseda, Y., University of Toronto (107)
Webb, B.A., DWA Composite Specialties, Inc. (35)
Weir, J.R., Jr., Oak Ridge National Lab. (80)
Werner, F.E., Westinghouse Electric Corporation (114)
White, C.W., Oak Ridge National Lab. (81)
Whitman, C.I., SCM Corporation (99)
Wienczek, T., Argonne National Laboratory (6)
Williams, J.C., Carnegie Mellon University (25)
Winter, J., Marvalaud, Inc. (62)
Wood, W.E., Oregon Graduate Center (83)
Yurek, G., Massachusetts Institute of Technology (63)
Zuckermann, M., McGill University (65)

END

DATE
FILMED

7-8-1

DTIC