

Preliminary Program

**Microgravity Transport Processes
in Fluid, Thermal, Biological
and Materials Sciences III**

September 14-19, 2003

Davos, Switzerland

Chair & Scientific Secretary:

Prof. S.S Sadhal

University of Southern California, USA

Co-Chairs:

Prof. V.K. Dhir

UCLA, USA

Prof. Naomi Chayen

Imperial College, U.K.

Prof. H. Ohta

Kyushu University, Japan

Prof. R.W. Smith

Queen's University, Canada

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Sunday, September 14, 2003

| | |
|--------------------|---------------------------------|
| 5:30 pm - 7:30 pm | Registration (Cresta Sun Lobby) |
| 7:00 pm – 7:30 pm | Welcome Reception |
| 7:30 pm - 9:00 pm | Dinner Introductory Remarks |
| 9:00 pm - 10:00 pm | Opening Reception |

Monday, September 15, 2003

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| 7:00 am – 8:00 am | Breakfast |
| 8:15 am – 8:45 am | Opening Remarks |
| 8:15 am – 8:30 am | S.S. Sadhal, Conference Chair |
| 8:30 am – 8:35am | ECI Representative |
| 8:35 am – 8:45 am | ESA Representative |
| 8:45 am – 11:15 am | <u>Session 1: Protein Crystal Growth</u> |

Keynote Lecture:

1. EFFECTS OF BUOYANCY DRIVEN CONVECTION ON NUCLEATION AND GROWTH OF PROTEIN CRYSTALS (Paper No. 15)

Christo N. Nanev, Institute of Physical Chemistry, Bulgarian Academy of Sciences
'akad. G. Bonchev' Str., bl. 11, Sofia, 1113, Bulgaria, Anita Penkova, Institute of Physical Chemistry, Bulgarian Academy of Sciences, Sofia, 1113, Bulgaria, Naomi Chayen, Biological Structure and Function Section, Division of Biomedical Sciences, Faculty of Medicine, Imperial College London, London SW7 2AZ, UK

2. DYNAMICS OF PATTERN FORMATION ON PROTEIN CRYSTAL SURFACES (Paper No. 02)

Peter G. Vekilov, University of Houston
Department of Chemical Engineering, Houston, Texas, 77204, USA

Monday, September 15, 2003 (continued)

3. NUCLEATION OF INSULIN CRYSTALS IN A WIDE CONTINUOUS SUPERSATURATION GRADIENT (Paper No. 20)

A. Penkova, Institute of Physical Chemistry, Bulgarian Academy of Sciences

'Acad. G. Bonchev' Str., bl. 11, Sofia, 1113, Bulgaria

I. Dimitrov, Chr. N. Nanev, Institute of Physical Chemistry, Bulgarian Academy of Sciences

Coffee Break (1/2 hour)

4. NUMERICAL ANALYSIS OF THE DEPLETION ZONE FORMATION AROUND A GROWING PROTEIN CRYSTAL (Paper No. 33)

Hiroaki Tanaka, NASDA

2-1-1 Sengen, Tsukuba, Ibaraki, 305-8505, Japan

Koji Inaka, Maruwa food Industries

Satoshi Sano, Masaru Sato, Susumu Yoshitomi, NASDA

5. SIMULATION OF PROTEIN CRYSTAL GROWTH: WHAT MODEL IS ADEQUATE? (Paper No. 44)

Alexander I. Zhmakin, A.F.Ioffe Physical Technical Institute, Russian Academy of Sciences, Polytechniceskaya 26,

St.Petersburg, 194021, Russia, Yuri N. Makarov, Semiconductor Technology Research, Inc., Dmitry Kh. Ofengeim, SoftImpact Ltd.

6. SIZE AND SHAPE DISTRIBUTION DETERMINATION OF BIOLOGICAL MACROMOLECULES IN AQUEOUS SOLUTIONS BY A NON-INVASIVELY IN-SITU OPERATING MINIATURIZED DEPOLARIZED DYNAMIC LIGHT SCATTERING INSTRUMENT (Paper No. 54)

Naomi Chayen, Imperial College London, Biological Structure and

Function Section, Division of Biomedical Sciences, London, SW7 2AZ, UK, K. Dierks, Dierks and Partner Hamburg, M. Diekmann,

European Space Agency, Holland.

7. SCIENTIFIC APPROACH ON THE OPTIMIZATION OF PROTEIN CRYSTALLIZATION CONDITION FOR MICROGRAVITY EXPERIMENTS (Paper No. 73)

Izumi Yoshizaki, Hirohiko Nakamura, National Space

Development Agency of Japan, 2-1-1 Sengen, Tsukuba, Ibaraki,

305-8505, Japan, Seijiro Fukuyama, Advanced Engineering

Services Co., Ltd , Hiroshi Komatsu, National Space Development

Agency of Japan, Iwate Prefectural University, Shinichi Yoda,

National Space Development Agency of Japan

Monday, September 15, 2003 (continued)

11:45 am – 1:00 pm

Session 2: Biotransport Phenomena

Keynote Lecture

1. BONE CELL SURVIVAL IN MICROGRAVITY: EVIDENCE THAT MODELED MICROGRAVITY INCREASES OSTEOBLAST SENSITIVITY TO APOPTOGENS (Paper No. 40)

I.M. Shapiro, M. Bucaro, C.S. Adams, Department of Orthopaedic Surgery, Thomas Jefferson University

1015 Walnut Street, Philadelphia, PA, 19107, USA, P.

Ayyaswamy, K. Mukundakrishnan School of Engineering and Applied Sciences, University of Pennsylvania, M V. Risbud, Department of Orthopaedic Surgery, Thomas Jefferson University.

2. MODELING OF PHOSPHATE ION TRANSFER TO THE SURFACE OF OSTEOBLASTS IN A ROTATING WALL VESSEL (Paper No. 88)

K. Mukundakrishnan , P. S. Ayyaswamy, Towne Building, 220 S, 33rd Street, University of Pennsylvania Philadelphia,

Pennsylvania, 19104-6315, USA, M. Risbud, Thomas Jefferson University, H.H. Hu, University of Pennsylvania, I. M. Shapiro, Thomas Jefferson University, Philadelphia, PA

1:00 pm – 2:00 pm

Lunch (Cresta Sun Hotel)

2:00 pm – 3:45 pm

Informal Discussions on Transport Phenomena in Biological Systems.

3:45 pm – 5:30 pm

Session 3: Crystal Growth I

Keynote Lecture: To be Announced

1. EFFECTS OF GRAVITY ON ZBLAN GLASS CRYSTALLIZATION (Paper No. 08)

Dennis S. Tucker, NASA, SD71, MSFC, Alabama, 35812, USA

Guy A. Smith, Gary Workman, University of Alabama in Huntsville

2. MICROSTRUCTURES OF FACETED-NONFACETED EUTECTIC ALLOYS SOLIDIFIED IN DROP TUBE (Paper No. 12)

C. D. Cao, B. Wei, Laboratory of Materials Science in Space Department of Applied Physics, Northwestern Polytechnical University, Xi'an, 710072, People's Republic of China

3. IN-SITU PRESSURE MEASUREMENTS DURING THE DETACHED GROWTH OF GERMANIUM (Paper No. 21)

M. P. Volz, NASA/Marshall Space Flight Center, SD46, Huntsville, Alabama, 35812, USA, W. Palosz, USRA, NASA/Marshall Space Flight Center

Monday, September 15, 2003 (continued)

5:30 pm – 5:45 pm

Tea/Coffee Break

5:45 pm – 7:30 pm

Session 4: Crystal Growth II

1. CRYSTALLIZATION FROM MOLTEN ZONE CENTER FORMED BETWEEN TWO PLATINUM TUBES (Paper No. 43)

H. Kimura, A. Miyazaki, K. Maiwa, H. Nakamura, Materials Engineering Laboratory, National Institute for Materials Science, 1-2-1 Sengen, Tsukuba, Ibaraki, 305-0047, Japan

2. NUMERICAL MODELING HEAT-MASS TRANSFER AT CRYSTAL GROWTH OF CALCIUM PHOSPHATES (Paper No. 47)

A.I. Fedyushkin, Institute for Problems in Mechanics of RAS, Moscow, Russia

Prospect Vernadskogo, 101, 1, Moscow, 119526, Russia

E.I. Suvorova, Institute Crystallography of RAS, Moscow, Russia

3. INFLUENCE VIBRATION ON HYDRODYNAMICS AND HEAT-MASS TRANSFER DURING CRYSTAL GROWTH (Paper No. 48)

A. Fedyushkin, N. Bourago, Institute for Problems in Mechanics of RAS

Prospect Vernadskogo 101, b.1, Moscow, 119526, Russia

4. GROWTH OF SILICON SINGLE CRYSTALS BY THE METHOD OF FLOATING-ZONE ELECTRON BEAM MELTING UNDER MICROGRAVITY CONDITIONS (Paper No. 56)

B.E.Paton, E.A.Asnis, V.F.Demchenko, S.P.Zabolotin, E.O.Paton Electric Welding Institute of the National Academy of Sciences of Ukraine, Kyiv, Ukraine, 11 Bozhenko str, Kyiv, 03680, Ukraine, P.I.Baransky, V.M.Babich, Institute for Physics of Semiconductors of the National Academy of Sciences of Ukraine

5. AHP CRYSTAL GROWTH METHOD AS THE INSTRUMENT FOR RESEARCH OF HEAT AND MASS TRANSFER AND INTERFACIAL KINETICS PROCESSES ON THE GROUND AND IN SPACE (Paper No. 63)

Vladimir Golyshev, Centre Thermophysical Researches 'Thermo' Institutskaya str. 1 bld., Alexandrov, Vladimir reg., 601650, Russia

8:00 pm – 9:30 pm

Dinner

9:30 pm – 10:30 pm

Social Hour

Tuesday, September 16, 2003

7:00 am – 8:00 am

Breakfast

8:00 – 11:00 am

Session 5: Materials Technology

Keynote Lecture: To be Announced

1. A MODIFIED SHEAR CELL FOR LIQUID DIFFUSION COEFFICIENT MEASUREMENT UNDER MICROGRAVITY CONDITIONS (Paper No. 5)

R.W.Smith, B.J. Yang, W.Huang, Queen's University, Kingston Nicol Hall 227, 60 Union Street, Kingston, Ontario, K7L 3N6, Canada

2. THE STUDY OF DEVITRIFICATION PROCESS(ES) IN HEAVY-METAL FLUORIDE GLASSES (Paper No. 6)

R. W. Smith, Ian Dunkley, Queen's University
60 Union Street, NICOL HALL, Kingston, ON, K7L 3N6, CANADA
Sudhanshu Varma, Supan Technologies

3. METASTABLE PHASE SEPARATION OF UNDERCOOLED CO-CU ALLOYS (Paper No. 11)

C. D. Cao, B. Wei, Laboratory of Materials Science in Space, Department of Applied Physics, Northwestern Polytechnical University, Xi'an, 710072, People's Republic of China

4. RADIATION TRANSPORT PROPERTIES OF POLYETHYLENE-FIBER COMPOSITES (Paper No. 25)

Raj K. Kaul, NASA, ED34, Marshall Space Flight Center, MSFC, AL, 35812, USA
A.F. Barghouty, NASA-MSFC & Roanoke College, USA, H.M. Dahche, Roanoke College, USA

Coffee Break (1/2 hour)

5. EFFECT OF MAGNETIC FIELD ON CRYSTALLINE STRUCTURE OF MAGNETOSTRICTIVE TbFe₂ ALLOY SOLIDIFIED UNIDIRECTIONALLY IN MICROGRAVITY (Paper No. 45)

Takeshi Okutani, National Institute of Advanced Industrial Science and Technology, AIST Tsukuba central 5, Japan, Tsukuba, Ibaraki, Hideaki Nagai, 305-8565, Yoshinori Nakata, National Institute of Advanced Industrial Science and Technology

6. CORIOLIS EFFECT ON FLOW STABILITY IN MUSHY LAYERS SOLIDIFYING IN MICRO-GRAVITY ENVIRONMENTS (Paper No. 89)

Saneshan Govender, University of Natal Durban, King George V Avenue, Durban, Kwa Zulu Natal, 4000, SOUTH AFRICA

Tuesday, September 16, 2003 (continued)

**7. GROUND-BASED DIFFUSION EXPERIMENTS ON LIQUID SN-IN SYSTEMS
USING THE SHEAR CELL SPECIALLY DESIGNED FOR THE MISSION FOTON-M1 (Paper No. 91)**

Shinsuke Suzuki, Institute for Materials Science and Technology, Technical University of Berlin, Germany

11:15 am – 12:45 pm

Session 6: Drops and Bubbles I

Keynote Lecture: To be Announced

1. CONTACT ANGLE DYNAMICS OF DROPLETS IMPACTING ON FLAT SUBSTRATES (Paper No. 19)

Constantine M. Megaridis, Ilker Bayer, University of Illinois at Chicago

Mechanical Engineering, M/C 251, 842 W. Taylor St., Chicago, IL, 60607-7022, USA

Vincent D. Butty, Dimos Poulikakos, Swiss Federal Institute of Technology (ETH-Zurich)

2. OPERATION OF A CONSTRAINED VAPOR BUBBLE RESEARCH CELL IN THE ABSENCE OF EXTERNAL NATURAL CONVECTION (Paper No. 03)

Peter C. Wayner, Jr., Joel L. Plawsky, Sumita Basu, Rensselaer Polytechnic Institute

110 8th Street, Troy, NY, 12180-3590, USA

1:00 pm – 2:00 pm

Lunch

2:00 pm – 3:45 pm

Session 7: Drops and Bubbles II

1. 3D UNIFIED CFD APPROACH TO MODELING OF BUBBLE PHENOMENA (Paper No. 24)

Chudanov Vladimir, A.E Aksenova, V.A Pervichko., Nuclear Safety Institute RAS, B. Tulskaia 52, Moscow, 113191, Russia

2. EFFECT OF MARANGONI CONVECTION TO MOVING DROPLET ALONG A PIPE SURFACE (Paper No. 52)

Hiroshi Sakuta, Aoyama Gakuin University, 6-16-1 Chitosedai, Setagaya, Tokyo, 157-8572, Japan

Hiroyuki Miyata, Shinnya Araki, Aoyama Gakuin University, Masaaki Okada, Tsukuba Technical College Takahiro Nagata, Mechanical Design and Analysis Co.

3. INFLUENCE OF FLUCTUATIONS OF THE WALL OF VOLUME ON DYNAMICS OF FLOATING-UP OF BUBBLES (Paper No. 60)

V. Eliseev, V. Luzenko V. Prisniakov, Institute Geotechnical Mechanics of National Academy of Science, 49005, Simpheropolskaya 2A, Dnipropetrovsk, Ukraine

Tuesday, September 16, 2003 (continued)

4. ONE STEPAN PROBLEM, DESCRIBING PHASE TRANSITIONS ON SURFACE OF DROPS (BUBBLES) IN

MICROGRAVITY (Paper No. 65)

E. K. Bevza, O.O. Kochubey, M.V. Polyakov, D.V. Yevdokymov,
Dnepropetrovsk National University

Nauchna str. 13, Dnepropetrovsk, 49050, Ukraine

5. BUBBLE FORMATION AND TRANSPORT DURING MICROGRAVITY MATERIALS PROCESSING: MODEL EXPERIMENTS ON THE INTERNATIONAL SPACE STATION

(Paper No. 79)

Richard Grugel, Marshall Space Flight Center, MS - SD46,
Huntsville, Alabama, 35812, USA

Amrutur V. Anilkumar, Vanderbilt University, Chun P. Lee,
Marshall Space Flight Center, Huntsville, Alabama, 35812, USA

3:45 pm – 5:30 pm

Informal Discussion on Materials Technology and Crystal Growth

5:30 pm – 7:30 pm

Session 8: Boiling Phenomena I

Keynote Lecture

1. STUDY ON SUCCOOLED POOL BOILING OF WATER (CONTACT AREA OF BUBBLES WITH HEATING SURFACE IN HEATING PROCESS) (Paper No. 55)

Koichi Suzuki, Saika Takahashi, Tokyo University of Science
2641 Yamazaki, Noda, Chiba, 278-8510, Japan

2. MOMENTUM EFFECTS IN STEADY NUCLEATE POOL BOILING DURING MICROGRAVITY (Paper No. 04)

Herman Merte, Jr., University of Michigan, Department of
Mechanical Engineering, Ann Arbor, MI, 48109-2125, USA

3. LOW GRAVITY BOILING HEAT TRANSFER ON A MESO-SCALE HEATER (Paper No. 16)

Christopher Henry, Jungho Kim, University of Maryland
Dept. of Mechanical Engineering, College Park, MD, 20742, USA

7:30 pm - 8:30 pm

Dinner

8:30 pm – 9:30 pm

Social Hour

Wednesday, September 17, 2003

7:00 am – 8:00 am

Breakfast

8:00 am – 10:00 am

Session 9: Boiling Phenomena II

1. DEVELOPMENT OF HIGH-PERFORMANCE BOILING HEAT EXCHANGER BY IMPROVED LIQUID SUPPLY TO NARROW CHANNELS (Paper No. 17)

Haruhiko OHTA, Toshiyuki OHNO, Fumiaki HIOKI, Yasuhisa SHINMOTO, Kyushu University
Dept. Aeronautics and Astronautics, 6-10-1 Hakozaki, Higashi-ku, Fukuoka, 812-8581, Japan

2. NUMERICAL SIMULATION AND EXPERIMENTAL VALIDATION OF THE DYNAMICS OF MULTIPLE BUBBLE MERGER DURING POOL BOILING UNDER MICRO GRAVITY CONDITIONS (Paper No. 29)

V.K. Dhir, H.S. Aparajith, G. Warriar, University of California, Los Angeles, Mechanical and Aerospace Engineering Department, 48-121 Westwood Plaza, Los Angeles, California, 90095, USA
G. Son, Sogang University, Mechanical Engineering Department

3. INFLUENCE OF ELECTRIC FIELD ON POOL BOILING ON A FLAT HEATER IN PARABOLIC FLIGHT (Paper No. 87)

P. Di Marco, W. Grassi, LOTHAR, Dept. of Energetics, University of Pisa
via Diotisalvi 2, Pisa, I-56126, Italy

4. MICROGRAVITY EXPERIMENT ON BOILING AND APPLICATIONS; RESEARCH ACTIVITY OF ADVANCED HIGH HEAT FLUX COOLING TECHNOLOGY FOR ELECTRONIC DEVICES IN JAPAN (Paper No. 90)

Koichi Suzuki, Hiroshi Kawamura, Tokyo University of Science, 2641, Yamasaki, Noda, Chiba, 278-8510, Japan

5. MICROGRAVITY EXPERIMENTS ON PHASE CHANGE OF SELF-WETTING FLUIDS (Paper No. 18)

Yoshiyuki Abe, AIST (National Institute of Advanced Industrial Science & Technology
1-1-1 Umezono, Tsukuba, Ibaraki, 305-8568, Japan, Akira Iwasaki, AIST
Kotaro Tanaka, Shizuoka Institute of Science & Technology

10:00 am – 10:30 am

Coffee Break

Wednesday, September 17, 2003 (continued)

10:30 am – 12:45 pm

Session 10: Interfacial Phenomena I

Keynote Lecture

V.I. Polezhaev: Topic to be announced

1. THE INTERACTION BETWEEN AN INSOLUBLE PARTICLE AND AN ADVANCING SOLID/LIQUID INTERFACE: MICROGRAVITY EXPERIMENTS AND THEORETICAL DEVELOPMENTS (Paper No. 14)

Adrian V. Catalina, Universities Space Research Association, USRA/SD46 NASA Marshall Space Flight Center, Huntsville, Alabama, 35812, USA, Subhayu Sen, Universities Space Research Association, Doru M. Stefanescu, The University of Alabama

2. NEAR CRITICAL FLOWS IN MICROGRAVITY (Paper No. 53)

V.I. Polezhaev, The Institute for Problems in Mechanics RAS, Prospect Vernadskogo, 101, b.1, Moscow, 119526, Russia, A.A. Gorbunov, E.B. Soboleva, The Institute for Problems in Mechanics RAS

3. GROUND-BASED EXPERIMENTS WITH MICROGRAVITY TWO-PHASE FLOW (Paper No. 68)

Dr. Masood Parang, Viatcheslav I. Naoumov, Brian Babis, Mechanical Engineering, The University of Tennessee, 414 Dougherty Engineering Building, Knoxville, Tennessee, 37996-2210, USA

4. THE FORMATION OF SPIKES IN THE DISPLACEMENT OF MISCIBLE FLUIDS (Paper No. 82)

R. Balasubramaniam, N. Rashidnia, National Center for Microgravity Research on Fluids and Combustion, Mail Stop 110-3, NASA John H. Glenn Research Center, 21000 Brookpark Road, Cleveland, OH, 44135, USA R.T. Schroer, National Center for Microgravity Research on Fluids and Combustion/ Case Western Reserve University

5. DEVELOPMENT OF HIGH FREQUENCY INSTABILITY ON THE INTERFACE OF A LIQUID ZONE (Paper No. 83)

V. Shevtsova, D. Melnikov, J.C. Legros, University of Brussels, CP-165/62
av. F.D.Roosevelt, 50, Bruxelles, 1050, Belgium

Wednesday, September 17, 2003

6. INTERNAL CONDENSING FLOWS AND EFFECTS OF GRAVITY AND SURFACE TENSION ON INTERFACIAL-WAVES AND HEAT-TRANSFER RATES – A COMPUTATIONAL/ EXPERIMENTAL STUDY (Paper No. 84)

Amitabh Narain, Q. Liang, X. Wang, Michigan Technological University, 1400 Townsend Drive, Houghton, MI, 49931-1295, USA

1:00 pm – 2:00 pm

Lunch

2:00 pm – 4:00 pm

Session 11: Interfacial Phenomena II (Marangoni Flows)

1. EXPERIMENTAL STUDY OF HEAT TRANSFER ASSOCIATED WITH A SINGLE AIR OR VAPOUR BUBBLE ON A DOWNWARD FACING HEATING ELEMENT. INFLUENCE OF THERMOCAPILLARY CONVECTION UNDER REDUCED GRAVITY (Paper No. 67)

C. Reynard, M. Barthès, R. Santini, L. Tadrist, Ecole Polytechnique Universitaire de Marseille, laboratoire IUSTI, UMR 6595, 5 rue Enrico Fermi Technopole de Chateau Gombert, Marseille, 13453, France

2. COMPUTER SIMULATION OF TEMPERATURE FIELDS INDUCED BY NONLINEAR MARANGONI EFFECTS INSIDE A VISCOUS FLUID IN THE SPACE ENVIRONMENT (Paper No. 69)

Sergey V. Oladyshkin, Nikolay N. Bobkov, Nizhnii Novgorod State Technical University
24 Minin Str., Nizhnii Novgorod, 603600, Russia, Uriy P. Gupalo, Institute of Mechanics Problems, Russian Academy of Sciences, Oleg R. Kozyrev, State University Higher School of Economics

3. EVAPORATIVE INSTABILITY IN THE PRESENCE OF MARANGONI AND RAYLEIGH CONVECTION (Paper No. 70)

R. Narayanan, O. Ozen, University of Florida, Department of Chemical Engineering, Gainesville, FL, 32611, USA

4. NON-LINEAR FLOW FIELD AND DYNAMIC PARTICLE ACCUMULATION IN THE THERMOCAPILLARY CONVECTION OF A LIQUID BRIDGE (Paper No. 76)

Shiho Tanaka, Ichiro Ueno, Hiroshi Kawamura, Tokyo University of Science, Dept., Mech., Eng., 2641, Yamazaki, Noda-shi, Chiba, 278-8510, Japan

Wednesday, September 17, 2003

5. SURFACTANT EFFECT ON THE DYNAMIC OF FLUID PARTICLES IN CAPILLARIES (Paper No. 77)

Eisa AlMatroushi, United Arab Emirates University, Chemical & Petroleum Engineering Department, Al-Ain, U.A.E., P.O. Box: 17555, U.A.E.

| | |
|--------------------|---|
| 3:30 pm – 5:30 pm | Free time and small-group breakout discussions |
| 5:30 pm – 7:30 pm | Informal Discussion on Drops, Bubbles and Boiling Phenomena and Interfacial Phenomena |
| 7:30 pm – 9:30 pm | Banquet |
| 9:30 pm – 10:30 pm | Social Hour |

Thursday, September 18, 2003

7:00 am – 8:00 am Breakfast

8:00 am – 11:30 am **Session 12: Fluid Dynamics**

Keynote Lecture: To be Announced

1. DENSITY-DRIVEN INSTABILITIES OF MISCIBLE FLUIDS IN A CAPILLARY TUBE (Paper No. 13)

Eckart Meiburg, S. Harith Vanaparthi, Matthias Payr, University of California at Santa Barbara
Department of Mechanical and Environmental Engineering, Santa Barbara, CA, 93106, USA

2. STABILITY OF A DOUBLE-DIFFUSIVE LAYER UNDER GRAVITY MODULATION (Paper No. 22)

C. F. Chen, Wen-Yau Chen University of Arizona, Department of Aerospace and Mechanical Engineering, Tucson, AZ, 85721, USA

3. EFFECT OF GRAVITY ON FLUID-STRUCTURAL DYNAMICS OF THE INNER EAR DURING CALORIC STIMULATION (Paper No. 23)

Mohammad Kassemi, National Center for Microgravity Research, NASA Glenn Research Center
21000 Brookpark Rd, MS110-3, Cleveland, Ohio, 44135, USA,
John G. Oas, Cleveland Clinic Foundation
Dimitri Deserranno, Case Western Reserve University

Thursday, September 18, 2003 (continued)

Coffee Break (1/2 hour)

4. NUMERICAL ANALYSIS AND GROUND-BASED EXPERIMENT OF THERMAL PHENOMENA AND FLUID BEHAVIORS IN ON-ORBIT TRANSFER TECHNIQUE (Paper No. 32)

Ryoji IMAI, Research Institute, Ishiwawajima-Harima Heavy Industries, 1, Shin-Nakahara-cho, Isogo-ku, Yokohama, Kanagawa, 235-8501, Japan, Osamu Kawanami, Osaka Prefecture University, Hisao Azuma, Osaka Prefecture University

5. AN EXPERIMENTAL STUDY OF RICHTMYER-MESHKOV INSTABILITY IN MICROGRAVITY (Paper No. 42)

Jeffrey W. Jacobs, University of Arizona, AME Department, Tucson, AZ, 85721, USA
Charles E. Niederhaus, NASA Glenn Research Center

6. GRAVITATIONAL EFFECTS ON SHEAR-INDUCED STRUCTURE DEVELOPMENT IN QUENCHED COMPLEX FLUIDS (Paper No. 58)

Sanjoy Banerjee, Vittorio Badalassi, University of California, Santa Barbara
Department of Chemical Engineering, Santa Barbara, California, 93106, U.S.A.
David M. Hall, Department of Physics, University of California, Santa Barbara

7. THE EFFECT OF TIME-DEPENDENT GRAVITY FIELDS ON THERMAL CONVECTIVE INSTABILITY (Paper No. 72)

Ranga Narayanan, University of Florida, Department of Chemical Engineering, Gainesville, FL, 32611, USA, P. Shukla, University of Florida

8. STABILITY ASPECTS OF GAS-LIQUID SLUG FLOW (Paper No. 75)

Andrea Prosperetti, Xiaozhen Lu, The Johns Hopkins University, 223 Latrobe Hall, Baltimore, MD, 21218, USA

11:30 am – 1:00 pm

Session 13: Acoustic and Levitation

Keynote Lecture

1. MANIPULATION OF FLUID OBJECTS WITH ACOUSTIC RADIATION PRESSURE

Philip L. Marston and David B. Thiessen, Department of Physics, Washington State University, Pullman, WA 99164-2814

Thursday, September 18, 2003 (continued)

2. ACOUSTIC LEVITATION FORCE ON DISK SAMPLES (Paper No. 09)

W. J. Xie, B. Wei, Laboratory of Materials Science in Space
Department of Applied Physics, Northwestern Polytechnical
University, Xi'an, 710072, People's Republic of China

**3. SOLIDIFICATION BEHAVIORS OF ACOUSTICALLY
LEVITATED DROPS** (Paper No. 10)

W. J. Xie, C.D. Cao, Y. J. Lu, B. Wei, Laboratory of Materials
Science in Space
Department of Applied Physics, Northwestern Polytechnical
University, Xi'an, 710072, People's Republic of China

1:00 pm – 2:00 pm

Lunch

2:00 pm - 3:30 pm

Session 14: Electrostatic Levitation

**1. THERMOPHYSICAL PROPERTIES OF LIQUID AND HIGH
TEMPERATURE SOLID TANTALUM, RHENIUM, AND
TUNGSTEN MEASURED WITH AN ELECTROSTATIC
LEVITATOR** (Paper No. 30)

Paul-Francois Paradis, Takehiko Ishikawa, National Space
Development Agency of Japan
2-1-1 Sengen, Tsukuba, Ibaraki, 305-8505, Japan

**2. THERMOPHYSICAL PROPERTY MEASUREMENTS AND
SOLIDIFICATION STUDIES WITH AN ELECTROSTATIC
LEVITATOR** (Paper No. 31)

Shinichi Yoda, Paul-Francois Paradis, J. Yu, Takehiko Ishikawa,
National Space Development Agency of Japan, 2-1-1 Sengen,
Tsukuba, Ibaraki, 305-8505, Japan

**3. CONTRASTING ELECTROSTATIC AND
ELECTROMAGNETIC LEVITATION EXPERIMENTAL RESULTS
FOR TRANSFORMATION KINETICS OF STEEL ALLOYS**
(Paper No. 35)

Douglas M. Matson, Tufts University, 200 College Ave., Medford,
MA, 02155, USA, Robert W. Hyers, University of Massachusetts,
Jan R. Rogers, NASA Marshall Space Flight Center

**4. ADVANCE IN THE DEVELOPMENT OF AN
ELECTROSTATIC LEVITATOR FOR STUDYING THE
PROPERTIES OF LIQUID DROPS AT MODEST
TEMPERATURES** (Paper No. 81)

K. Ohsaka, University of Southern California, University Park
Campus, Los Angeles, California, 90089, USA

3:00 pm – 4:30 pm

Informal discussion on levitation techniques and fluid dynamics

Thursday, September 18, 2003 (continued)

4:30 pm – 7:30 pm

Session 15: Electromagnetic Phenomena

Keynote Lecture: Topic to be announced

Narayanan Ramachandran, Universities Space Research Association, SD 46, NASA Marshall Space Flt. Ctr., Huntsville, AL, 35812, USA, Fred Leslie, SD 46, NASA MSFC

1. CONTROL OF THERMAL CONVECTION IN LAYERED FLUIDS USING MAGNETIC FIELDS (Paper No. 36)

Narayanan Ramachandran, Universities Space Research Association, SD 46, NASA Marshall Space Flt. Ctr., Huntsville, AL, 35812, USA, Fred Leslie, SD 46, NASA MSFC

2. STABILITY ANALYSIS OF FLOW INDUCED BY THE TRAVELING MAGNETIC FIELD (Paper No. 27)

Konstantin Mazuruk, USRA, NASA/MSFC/SD46, Huntsville, Alabama, 35812, U.S.A.

3. MAGNETIC MICROSPHERES AND TISSUE MODEL STUDIES FOR THERAPEUTICAL APPLICATIONS (Paper No. 37)

Dr. Narayanan Ramachandran, Universities Space Research Association, SD46 NASA Marshall Space Flight Center, Huntsville, AL, 35812, USA, Dr. K. Mazuruk, USRA/NASA Marshall Space Flight Center

4. USING STRONG MAGNETIC FIELDS TO CONTROL SOLUTAL CONVECTION (Paper No. 38)

Narayanan Ramachandran, Universities Space Research Association, SD 46, NASA Marshall Space Flt. Ctr., Huntsville, AL, 35812, USA, Fred Leslie, SD 46, NASA MSFC

5. CONVECTION IN CONTAINERLESS PROCESSING (Paper No. 41)

Robert W. Hyers, University of Massachusetts, 160 Governors Dr., Amherst, MA, 01003, USA

Douglas M. Matson, Tufts University, Medford, MA, USA,
Kenneth F. Kelton, Washington University, St. Louis, MO, USA,
Jan R. Rogers, NASA/MSFC, Huntsville, AL, USA

6. ACTIVE ELECTROSTATIC CONTROL OF LIQUID BRIDGE DYNAMICS AND STABILITY (Paper No. 50)

David B. Thiessen, Wei Wei, Philip L. Marston, Washington State University, Physics Department, 2814, Pullman, WA, 99164, USA

Thursday, September 18, 2003 (continued)

7. NUMERICAL SOLUTION OF MELTING IN SIDE-HEATED RECTANGULAR ENCLOSURE UNDER ELECTROMAGNETICALLY SIMULATED LOW GRAVITY (Paper No. 61)

Eduardo Goncalves and Mohammad Faghri, Department of Mechanical Engineering, University of Rhode Island, Wales Hall, 92 Upper College Road, Kingston, Rhode Island, 02881, USA, Yutaka Asako, Department of Mechanical Engineering, Tokyo Metropolitan University; Tokyo, Japan , Majid Charmchi, Department of Mechanical Engineering, University of Massachusetts; Lowell, Massachusetts, USA

8. NUMERICAL STUDY OF THERMOMAGNETIC CONVECTION IN A SQUARE CAVITY IN ABSENCE OF GRAVITY (Paper No. 80)

Iswar K Puri, Ranjan Ganguly, Swarnendu Sen, University of Illinois at Chicago, Mechanical Engg. Dept., MC 251, 2039 ERF, 842 West Taylor Street, Chicago, ILLINOIS, 60607-7022, USA

8:00 pm – 9:30 pm

Dinner

9:30 pm -10:30 pm

Social Hour and Informal Discussion on Levitation Techniques and Electromagnetic Phenomena

Friday, September 19, 2003

7:00 am – 8:00 am

Breakfast

8:00 am – 8:50 am

Session 16: Space Systems I: Microgravity Combustion

1. MICROGRAVITY EFFECTS ON COMBUSTION OF POLYMERS (Paper No. 01)

David Hirsch, Honeywell International, NASA JSC WSTF, P.O. Box 20, Las Cruces, New Mexico, 88004, USA, Harold Beeson, NASA JSC White Sands Test Facility, Mike Pedley, NASA JSC

2. FLAME PROPAGATION IN SPRAY AND PARTICLE CLOUD OF LESS VOLATILE FUELS (Paper No. 62)

Takashi Niioka, Tohoku University, Institute of Fluid Science, 2-1-1, Katahira, Aoba-ku, Sendai, Miyagi, 980-8577, Japan, Y. Nunome, H. Hanai, H. Kobayashi, Tohoku University

Friday, September 19, 2003 (continued)

8:50 am - 11:10 am

Session 17: Space Systems II

1. EXTRA LOW GRAVIMETER FOR BIOLOGICAL SCIENCES TASKS (Paper No. 26)

Yaroslav Savenko, Petro Dem'yanenko, Yuriy Zinkovskiy, National Technical University of Ukraine 'Kiev Polytechnic Institute', 9 Kurchatova Street, Flat 20, Kiev, --, 02166, Ukraine

2. ZERO-BOIL-OFF PRESSURE CONTROL OF TWO-PHASE CRYOGENIC STORAGE TANKS IN MICROGRAVITY (Paper No. 28)

Mohammad Kassemi, National Center for Microgravity Research, NASA Glenn Research Center
21000 Brookpark Rd, MS110-3, Cleveland, Ohio, 44135, USA
Charles Panzarella, Ohio Aerospace Institute

3. THE EFFECT OF GRAVITY ON THE STRUCTURES AND THE PROPERTIES OF ALUMINIUM WELDINGS (Paper No. 39)

Stefano Ferretti, Alessandro Freddi, University of Bologna, Viale Roma 356, Forli, FO, 47100, Italy
University of Bologna, Giorgio Poli, University of Modena e Reggio, Franco Persiani, University of Bologna, Dean 2nd faculty of engineering

Coffee Break (1/2 hour)

4. PRELIMINARY EXPERIMENT OF ON-ORBIT TRANSFER TECHNIQUE USING SWIRL FLOW UNDER MICROGRAVITY (Paper No. 46)

Osamu Kawanami, Yumi Hayase, Hisao Azuma, Osaka Prefecture University, 1-1 Gakuen-cho, Sakai, Osaka, 599-8531, Japan, Ryoji Imai, Ishiwawajima-Harima Heavy Industries
Haruhiko Ohta, Kyushu University

5. ANALYSIS OF FUEL SLOSHING UNDER MICRO-GRAVITY YIELDS NEW CRYOGENIC BAFFLED TANK DESIGN (Paper No. 49)

Faure Joel Malo-Molina, Sverdrup Technologies (AEDC group)
405 Timberlane Avenue, Tullahoma, Tennessee, 37388, USA
Kau Fui V. Wong, University of Miami

11:10 am – 1:00 pm

Session 18: Space Systems III

1. MICROGRAVITY ACTIVITIES FOR THE VINCI ENGINE RE-IGNITION CAPABILITY (Paper No 34)

Anne PACROS, Jeremy FOLLET, Veronique JOVER, Snecma Moteurs
Foret de Vernon BP 802, Vernon Cedex, 27208, FRANCE

Friday, September 19, 2003 (continued)

2. PRELIMINARY FLIGHT SYSTEM DESIGN AND SUPPORTING GROUND EXPERIMENTS FOR A PLANNED PARTICLE DYNAMICS EXPERIMENT ABOARD THE ISS

(Paper No. 86)

James Trolinger, MetroLaser Inc.
2572 White Road, Irvine, CA, 92614, USA, Drew L'Esperance,
MetroLaser Inc., Roger Rangel, University of California, Irvine,
Carlos Coimbra, University of Hawaii, William Witherow, NASA
Marshall Space Flight Center

5. GRAVITATIONAL EFFECTS ON THE WELD POOL SHAPE AND MICROSTRUCTURAL EVOLUTION DURING GAS TUNGSTEN ARC WELDING OF 304 STAINLESS STEEL AND AL-4 W/O CU ALLOY (Paper No. 78)

Namhyun Kang, Jogender Singh, Anil K. Kulkarni, The
Pennsylvania State University
118 MRI Bldg., Innovation Park, University Park, PA, 16802, USA

3. BOUNDARY ELEMENT METHOD APPLICATION TO HEAT AND MASS TRANSFER IN MICROGRAVITY (Paper No. 64)

D. V. Yevdokymov, E. K. Bevza, O.O. Kochubey, Dniepropetrovsk
National University, Nauchna str. 13., Dniepropetrovsk, 49050,
Ukraine

4. MULTIPHASE SYSTEMS INSIDE SPACE VEHICLES (Paper No. 66)

Yu. V. Brazaluk, M. V. Polyakov, D. V. Yevdokymov,
Dniepropetrovsk National University
Nauchna str. 13, Dniepropetrovsk, 49050, Ukraine

1:00 pm– 2:30 pm

Lunch, Concluding Remarks and Wrap-up