

# SYMPOSIUM MM

Granular Material-Based Technologies

December 2 – 3, 2002

## Chairs

Surajit Sen  
Melany L. Hunt  
Alan J. Hurd

SUNY-Buffalo  
Caltech  
Los Alamos National Laboratory

## Symposium Support

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\* Invited paper

SESSION MM1: ELECTROMAGNETIC FIELDS  
Chair: Melany L. Hunt  
Monday Morning, December 2, 2002  
Hampton (Sheraton)

### 8:30 AM \*MM1.1

SELF-ORGANIZATION OF FORCED SYSTEMS: (I) MAGNETIZED PARTICLES ROTATING AT A LIQUID-AIR INTERFACE AND (II) DYNAMICS OF VERTICALLY VIBRATED WET GRANULAR MATERIALS. Howard A. Stone, Division of Engineering and Applied Sciences, Harvard University, Cambridge, MA.

### 9:00 AM MM1.2

GENERATING STRANGE INTERACTIONS IN PARTICLE SUSPENSIONS. James E. Martin, Robert A. Anderson, Rod L. Williamson, Sandia National Laboratories, Albuquerque, NM.

### 9:15 AM MM1.3

CLUSTERING TRANSITIONS IN EXCITED, MAGNETIZED GRANULAR MATERIAL. Daniel Blair, Arshad Kudrolli, Clark University, Dept of Physics, Worcester, MA.

### 9:30 AM BREAK

### 10:00 AM \*MM1.4

ORDERED GRANULAR MATERIALS: MAGNETIC NANOPARTICLE ARRAYS. Dorothy Farrell, Yi Ding, Saeki Yamamuro, and Sara A. Majetich, Carnegie Mellon Univ, Dept of Physics, Pittsburgh, PA.

### 10:30 AM MM1.5

SIMULATION OF MULTI-COMPONENT CHARGED PARTICLE SYSTEMS. John G. Shaw, Ted Retzlaff, Xerox Corporation, Wilson Center for Research and Technology, Webster, NY.

### 10:45 AM MM1.6

ELECTRICAL AND THERMAL TRANSPORT PROPERTIES OF DENSELY PACKED GRANULAR  $\text{CaAl}_2$ . M. Ausloos, University of Liège, Liège, BELGIUM; M. Pękala, University of Warsaw, Warsaw, POLAND; J. Mucha, Polish Academy of Sciences, Wrocław, POLAND; Ph. Vanderbemden, University of Liège, Liège, BELGIUM; R. Cloots, University of Liège, Liège, BELGIUM.

### 11:00 AM MM1.7

DETONATION CONSOLIDATION OF  $\text{NiFe/SiO}_2$  AND  $\text{Co/SiO}_2$  NANOCOMPOSITES. Xinqing Ma, Y.D. Zhang, S. Hui, Mingzhong Wu and Shihui Ge, Inframat Corporation, Farmington, CT.

### 11:15 AM MM1.8

DISCRETE ELEMENT SIMULATION OF THERMOELECTRICAL

PHENOMENA IN PARTICULATE SYSTEMS. Jing Zhang and Antonios Zavalangos, Drexel University, Dept. of Materials Engineering, Philadelphia, PA.

### 11:30 AM MM1.9

DEFECT-INDUCED VISIBLE LUMINESCENCE OF GRANULAR SILICA FILMS FABRICATED BY PULSED ION BEAM ABLATION WITH RHEPP-1. N. Kishimoto, Nanomaterials Laboratory, NIMS, Tsukuba, Ibaraki, JAPAN; T.J. Renk, Sandia National Laboratories, Albuquerque, NM; N. Umeda, University of Tsukuba, Tsukuba, Ibaraki, JAPAN; M.O. Thompson, Cornell University, Ithaca, NY.

### 11:45 AM MM1.10

AN INVESTIGATION ON ELECTRON-BEAM INDUCED CATIONIC POLYMERIZATION OF EPOXY RESINS. Narendra Nath Ghosh, Chemistry Group, Birla Institute of Technology and Science-Pilani, Rajasthan, INDIA.

## SESSION MM2: STRUCTURAL ISSUES

Chair: Robert E. Ecke  
Monday Afternoon, December 2, 2002  
Hampton (Sheraton)

### 1:30 PM \*MM2.1

PHYSICAL SOURCE OF MEMORY FUNCTIONS IN THE THEORY OF STRESS DISTRIBUTION IN GRANULAR COMPACTS. V.M. Kenkre, University of New Mexico, Center for Advanced Studies and Department of Physics, Albuquerque, NM.

### 2:00 PM MM2.2

ON PROBABILISTIC DISTRIBUTION OF FORCES IN COHESIVE GRANULAR MATERIALS: A STATISTICAL MECHANICS APPROACH. Alfons H.W. Ngan, Department of Mechanical Engineering, University of Hong Kong, Hong Kong, P.R. CHINA.

### 2:15 PM MM2.3

MAXIMUM PORE VOLUME FRACTION AND PORE SIZE FOR FRACTURE ENERGY RETENTION BY POROUS BODIES. L.J. Vandeperre, W.J. Clegg, Ceramics Laboratory, Department of Materials Science and Metallurgy, University of Cambridge, Cambridge, UNITED KINGDOM.

### 2:30 PM BREAK

### 3:00 PM MM2.4

MODEL SIMULATION OF POWDER COMPACTION BY COMPLEX MOLD BASED ON DEFORMATION BEHAVIOR OF FREE PARTICLES MEASURED BY COMPRESSION TEST. Hitoshi Hashimoto, Zheng Ming Sun, Yong Ho Park, Toshihiko Abe, Inst. for Structural and Engineering Materials, AIST, Tohoku, Sendai, JAPAN.

### 3:15 PM MM2.5

ELASTIC MODULUS OF GRANULAR ASSEMBLIES WITH HIERARCHICAL STRUCTURE. William J. Walker Jr., NYS Center for Advanced Ceramic Technology at Alfred University, Alfred, NY.

### 3:30 PM \*MM2.6

STUDIES OF RESIDUAL STRESS, MICROCRACKS, HARDNESS AND MICROSTRUCTURE OF COLD COMPACTED METALLIC GREEN BODIES. Torsten Ericsson, Linköping University, Dept of Mechanical Engineering, Linköping, SWEDEN.

### 4:00 PM MM2.7

SUBMICRON  $(\text{Ba}_{0.95}\text{Ca}_{0.05})(\text{Ti}_{0.8}\text{Zr}_{0.2})\text{O}_3$  POWDER SYNTHESIS VIA HYDROTHERMAL TREATMENT. Kyoon Choi, Byong-Hyeon Park, Eui-Seok Choi, Jin-Hyeon Hwang<sup>†</sup>, Jong-Hee Kim<sup>†</sup>, Korea Institute of Ceramic Engineering and Technology, Seoul, KOREA; <sup>†</sup>Samsung Electro-mechanics Co., Ltd., Suwon, KOREA.

### 4:15 PM MM2.8

CREEP RELAXATION OF A SPRING-BLOCK SYSTEM ON A GRANULAR LAYER. Ryan O'Donnell and Arshad Kudrolli, Clark Univ, Department of Physics, Worcester, MA.

### 4:30 PM MM2.9

IMAGING OF SHALLOW BURIED OBJECTS IN SOIL VIA MECHANICAL IMPULSE BACKSCATTERING. Surajit Sen, Dept of Physics, SUNY-Buffalo, Buffalo, NY; Donald P. Visco Jr., Dept. of Chemical Engineering, Tennessee Technological University, Cookeville, TN.

### 4:45 PM MM2.10

GRANULAR STATE EFFECTS ON WAVE PROPAGATION. Stephen R. Hostler, Christopher E. Brennen, California Institute of Technology, Pasadena, CA.

SESSION MM3: FLOW BEHAVIOR

Chair: V. M. Kenkre  
Tuesday Morning, December 3, 2002  
Hampton (Sheraton)

**8:30 AM \*MM3.1**

NUMERICAL STUDIES OF MULTI-COMPONENT MIXTURES.  
Deborah Sulsky, Department of Mathematics and Statistics,  
University of New Mexico, Albuquerque, NM; Jerry Brackbill, Los  
Alamos National Laboratory, Los Alamos, NM.

**9:00 AM MM3.2**

THE EFFECT OF A NON-EQUIPARTITION OF ENERGY ON  
THE SEPARATION OF MULTICOMPONENT FLOWS.  
Christine M. Hrenya, University of Colorado, Department of Chemical  
Engineering, Boulder, CO.

**9:15 AM MM3.3**

FORMATION OF SHEAR BANDS IN ANNULAR SHEAR  
GRANULAR FLOWS. Payman Jalali, Mo Li, Georgia Institute of  
Technology, School of Material Science and Engineering, Atlanta, GA.

**9:30 AM BREAK**

**10:00 AM MM3.4**

DYNAMIC BEHAVIOR OF AN INTRUDER IN A GRANULAR  
COUETTE FLOW. Anthony Rosato, Jian Liu, New Jersey Institute  
of Technology, Dept of Mechanical Engineering, Newark, NJ.

**10:15 AM MM3.5**

SOUND GENERATION IN SHEARED SAND. Melany L. Hunt,  
Christopher E. Brennen, Division of Engineering and Applied Science,  
Caltech, Pasadena, CA.

**10:30 AM \*MM3.6**

SIZE AND DENSITY SEPARATION IN GRANULAR MATERIALS.  
Heinrich M. Jaeger, University of Chicago, James Franck Institute  
and Department of Physics, Chicago, IL.

SESSION MM4: DYNAMICAL PROBLEMS

Chair: Anthony Rosato  
Tuesday Afternoon, December 3, 2002  
Hampton (Sheraton)

**1:30 PM \*MM4.1**

DYNAMICS OF VERTICALLY VIBRATED GRANULAR CHAINS.  
Robert Ecke, Zahir Daya, Eli Ben-Naim, Matt Hastings, Los Alamos  
National Laboratory, Los Alamos, NM.

**2:00 PM MM4.2**

VORTICES AND COARSENING IN VIBRATED GRANULAR  
RODS. E. Fredrick, T. Neicu, D. Blair, and A. Kudrolli, Dept. of  
Physics, Clark University, Worcester, MA.

**2:15 PM \*MM4.3**

GRANULAR MATERIALS-SHOCK (BLAST) MITIGATORS.  
Vitali F. Nesterenko, Department of Mechanical and Aerospace  
Engineering, UC San Diego, La Jolla, CA.

**2:45 PM BREAK**

**3:15 PM \*MM4.4**

IMPULSE DISPERSION IN A TAPERED GRANULAR CHAIN.  
Masami Nakagawa, Colorado School of Mines and NASA-Glenn IPA,  
Dept of Mining Engineering, Golden, CO; Juan H. Agui, NASA-Glenn  
Research Center, Cleveland, OH; David Vivanco Extramiana,  
Colorado School of Mines, Dept of Mining Engineering, Golden, CO.

**3:45 PM MM4.5**

IMPULSE ABSORPTION AND ENERGY RECOVERY IN  
TAPERED CHAINS. Surajit Sen, Dept of Physics, SUNY-Buffalo,  
Buffalo, NY; Soumya Chakravarti, Dept of Physics, California State  
Polytechnic University, Pomona, CA.

**4:00 PM MM4.6**

MECHANICAL BEHAVIOR OF ENERGETIC MATERIALS  
DURING HIGH ACCELERATION. Y.D. Lanzerotti, U.S. Army  
TACOM-ARDEC, Picatinny Arsenal, NJ; J. Sharma, Naval Surface  
Warfare Center, Carderock Division, West Bethesda, MD.

**4:15 PM MM4.7**

STUDIES OF VAPOR-DEPOSITED THIN-FILM ENERGETIC  
MATERIAL COMBUSTION. Michael Daugherty and Michelle  
Pantoya, Mechanical Engineering Department, Texas Tech University,  
Lubbock, TX.