



The International Organization on
Shape Memory and
Superelastic Technologies

An Affiliate Society of ASM International®

2006 ADVANCE PROGRAM

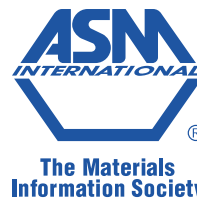
The International Conference on Shape Memory and Superelastic Technologies

May 7-11, 2006
Asilomar Conference Grounds
Pacific Grove, California USA

**Plan now to be a part of this year's
premier event dedicated to this
special class of unique materials.**

- Special Pre-Event Workshop
 - Nitinol – Beyond the Fundamentals
- Welcome Reception
- Technical Program
 - Production & Processing
 - Surface Engineering
 - Materials Characterization
 - Fatigue & Fracture
 - Corrosion
 - Biocompatibility
 - Design Engineering
 - R&D Trends
 - Innovative Applications
- Product Exhibition
- Gala Banquet at the Monterey Bay Aquarium

Sponsored by:



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Chairman's Welcome

You are invited to join the global shape memory community at the 2006 International Conference on Shape Memory and Superelastic Technologies, sponsored by SMST, an affiliate society of ASM International®. The SMST Conference brings together scientists, engineers and academics from around the world. This event will encourage and develop the practical engineering aspects of shape memory alloys, and is the authoritative source for the latest in technical advances, innovative applications and leading edge R & D in the field of shape memory and superelastic technology.

For 2006, the event is preceded by an industry-specific workshop entitled: *Nitinol – Beyond the Fundamentals*, which will be held the day before the conference begins. This workshop will build on previous SMST/ASM Nitinol courses. Many conference networking opportunities are also available, including a Product Exhibition evening, and numerous social functions throughout the week.

This four-day technical and networking conference will be held at the Asilomar Conference Grounds in Pacific Grove, California, on the Pacific Ocean, near the famous Pebble Beach Golf Resort, Scenic 17-Mile Drive and the cities of Monterey and Carmel. Rustic in design, this facility provides an excellent mix of opportunities to experience a natural environment and at the same time, enjoy all modern conference-related conveniences in a peaceful surrounding.

There will be a free afternoon on Wednesday to further enjoy the beautiful surroundings and take part in activities offered by this unique area. The afternoon will be followed by a festive conference banquet at the Monterey Bay Aquarium.

On behalf of the SMST 2006 Organizing Committee, I look forward to having you join us May 7-11 at the Asilomar Conference Grounds in Pacific Grove, CA.

Jim Proft

Metallurgical Solutions

SMST 2006 Conference Chairman



Jim Proft holds a B.S. degree in Materials Engineering from the University of Wisconsin-Milwaukee and an MS in Materials Science and Engineering from Stanford University. He has been active in the field of shape memory and superelastic alloys since 1984. He has held positions

at Raychem Corporation including R&D Engineer and Product Marketing Manager. He has also held the position of Vice President at Shape Memory Applications and Vice President and General Manager of Memry Corporation's Western Operations. Mr. Proft founded Metallurgical Solutions in 1999 and today is actively involved in the application of shape memory and superelastic alloys by providing products and services to a variety of manufacturers and product development companies. He has authored or co-authored numerous articles pertaining to Nitinol, has been involved with the planning of past SMST conferences, and has served as a board member of SMST since its inception as a non-profit entity.

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Program At-A-Glance

Sunday, May 7	Monday, May 8		Tuesday, May 9		Wednesday, May 10	Thursday, May 11
8:45 a.m.- 4:45 p.m. <i>Nitinol – Beyond the Fundamentals Educational Workshop (Monterey Marriott Hotel)</i> <i>(Page 13)</i>	8:15-8:30 a.m. Welcome and Opening Remarks <i>(Page 4)</i>		8:30-9:50 a.m. Session 5: Thin Films, Powder, and Porous Materials <i>(Page 6-7)</i>	8:30-9:50 a.m. Session 6: Alloy Production and Processing <i>(Page 7)</i>	8:30-9:50 a.m. Session 11: Metallurgical Fundamentals <i>(Page 10)</i>	8:30-9:50 a.m. Session 13: Future Directions including Panel Discussion <i>(Page 10)</i>
	8:30-9:50 a.m. Session 1: Fatigue and Fracture <i>(Page 4)</i>					
	9:50-10:10 a.m. <i>Refreshment Break</i>		9:50-10:10 a.m. <i>Refreshment Break</i>		9:50-10:10 a.m. <i>Refreshment Break</i>	9:50-10:10 a.m. <i>Refreshment Break</i>
	10:10-11:30 a.m. Session 1: Fatigue and Fracture (continued) <i>(Page 4)</i>		10:10-11:30 a.m. Session 5: Thin Films, Powder, and Porous Materials (continued) <i>(Page 6-7)</i>	10:10-11:30 a.m. Session 6: Alloy Production and Processing (continued) <i>(Page 7)</i>	10:10-11:30 a.m. Session 12: Theory for Design and Discovery <i>(Page 11)</i>	10:10-11:30 a.m. Session 14: Medical Applications – A Joint Session with the Society for Medical Innovation and Technology <i>(Page 11)</i>
	12:00-1:30 p.m. <i>Lunch Break</i>		12:00-1:30 p.m. <i>Lunch Break</i>		12:00-1:30 p.m. <i>Lunch Break</i>	11:30 a.m.-1:30 p.m. <i>Beach Barbecue</i>
	1:30-2:50 p.m. Session 2: Materials Characterization and Experimentation <i>(Page 4-5)</i>	1:30-2:50 p.m. Session 3: Surface Processing and Biological Response <i>(Page 5)</i>	1:30-2:50 p.m. Session 7: Actuators and Other Non-Medical Applications <i>(Page 8)</i>	1:30-2:50 p.m. Session 8: Thermal-Mechanical Fatigue <i>(Page 8)</i>	Afternoon Open – Explore Monterey and Carmel area	Conference Adjourns
	2:50-3:10 p.m. <i>Refreshment Break</i>		2:50-3:10 p.m. <i>Refreshment Break</i>			
	3:10-4:50 p.m. Session 2: Materials Characterization and Experimentation (continued) <i>(Page 4-5)</i>	3:10-4:50 p.m. Session 4: Corrosion and Biocompatibility <i>(Page 6)</i>	3:10-4:30 p.m. Session 9: Exemplary Applications <i>(Page 9)</i>	3:10-4:30 p.m. Session 10: Device Modeling and Testing <i>(Page 9)</i>		
	5:00-8:30 p.m. Meet the Authors Session <i>(Page 15)</i>		5:00-6:00 p.m. Product Exhibition Opens			
	6:00 p.m. <i>Dinner Break</i>		6:00 p.m. <i>Dinner Break</i>			
7:00-10:00 p.m. Welcome Reception	8:30-10:00 p.m. Bonfire		7:00-10:00 p.m. Product Exhibition (continued)		7:30-10:30 p.m. Banquet – Monterey Bay Aquarium	

This program is tentative: Sessions, papers, authors and order of presentations are subject to change.

Technical Program

8:15 a.m.

Welcome and Opening Remarks: *J. L. Proft*, Metallurgical Solutions, Redwood City, CA

Session 1: Fatigue and Fracture

Monday, May 8, 2006 • 8:30-11:30 a.m.

Session Chair: *B. James*, Exponent Failure Analysis Associates, Menlo Park, CA

Effects of Surface Modifications and Processing: *M. Polinsky*, D. Norwich, M. H. Wu, Memry Corporation, Bethel, CT

Effect of Surface Quality and Microstructure on Fatigue Behavior of Nitinol Stent Components: *A. Schuessler*, R. Steegmueller, G. Siekmeyer, Admedes Schuessler GmbH, Pforzheim, Germany

Tension-Tension Fatigue Testing of Nitinol Wires: *S. Walak*, Boston Scientific Corporation, Watertown, MA

Ultrahigh Resolution Diffraction Characterization of the Local Mechanics at a Crack Tip: *S. Robertson*², A. Mehta¹, X. Y. Gong³, A. Pelton³, R. Ritchie², (1)Stanford Synchrotron Radiation Laboratory, Menlo Park, CA, (2)Lawrence Berkeley National Laboratory, Berkeley, CA, (3)Nitinol Devices & Components, Fremont, CA

The Significance of Melt Practice on Fatigue Properties of Superelastic NiTi Fine Diameter Wire: *M. M. Patel*¹, D. L. Plumley¹, R. Bouthot¹, J. L. Proft², (1)Fort Wayne Metals Research Products Corporation, Fort Wayne, IN, (2)Metallurgical Solutions, Redwood City, CA

A Fracture Mechanics-Based Approach to Fatigue of Nitinol Tube: *S. Robertson*, J. Stankiewicz, R. Ritchie, Lawrence Berkeley National Laboratory, Berkeley, CA

Fatigue Resistance of Superelastic NiTi Alloys Subjected to Torsional and Bending Loading: *A. Knopik*, W. Predki, Ruhr-Uni-Bochum, Bochum, Germany

Effects of Aging on the Fatigue of Nitinol: *X. Y. Gong*, C. Trepanier, T. Lopes, M. Connally, Nitinol Devices & Components, Fremont, CA

Posters

- **Endodontic Instruments with Improved Fatigue Resistance:** *C. J. Berendt*¹, J. Yang², (1)Sportswire L.L.C., Langley, OK, (2)Global Nitinol Technologies, Saratoga, CA
- **An Investigation of Diverse Surface Finishes on Fatigue Properties of Superelastic Nitinol Wire:** *R. Gordon*¹, M. M. Patel², (1)Medical Metals LLC, Ridgefield, CT, (2)Fort Wayne Metals Research Products Corporation, Fort Wayne, IN
- **Mechanical Effects of Ultrasound Cleaning on Nitinol Micro-Components – Investigating Vibration Dynamics during Acoustical Cleaning Processes:** *B. Schrader*, G. Siekmeyer, A. Schuessler, Admedes Schuessler GmbH, Pforzheim, Germany

- **Bending Fatigue Study of Radiopaque Nitinol:** *Z. C. Lin*¹, D. Mackiewicz¹, K. Pike¹, J. Harrison², J. Boylan², (1)Guidant Corporation, Santa Clara, CA, (2)Guidant Corporation, Temecula, CA
- **Surface Strain Verification for a Fatigue Study:** *Z. C. Lin*, D. Mackiewicz, K. Pike, Guidant Corporation, Santa Clara, CA
- **Characterization of Low Cycle Fatigue in an Animal Model:** *A. Kharikanian*, M. Alexander, R. Williams, S. Nikolic, CardioKinetix, Inc., Redwood City, CA

Session 2: Materials Characterization and Experimentation

Monday, May 8, 2006 • 1:30-4:50 p.m.

Session Chair: *K. Gall*, Georgia Institute of Technology, Atlanta, GA

In Situ Texture Measurements of Stress-Induced Martensite in Superelastic NiTi using Hard Synchrotron Radiation: *W. Schmahl*², M. Hasan¹, A. Baruj³, J. Khalil-Allafi⁴, S. Gollerthan¹, (1)Ruhr-University Bochum, Bochum, Germany, (2)Ludwig-Maximilians-Universität, München, Germany, (3)Comision Nacional de Energia Atomica, Buenos Aires, Argentina, (4)Sahand University of Technology, Tabriz, Iran

Stress-Induced Martensitic Transformations and Shape Memory at Nanometer Scales: *K. Gall*², C. Frick¹, T. W. Lang¹, K. Spark¹, (1)University of Colorado, Boulder, CO, (2)Georgia Institute of Technology, Atlanta, GA

Development and Characterization of Improved High Temperature Shape Memory Alloys by Solid Solution Strengthening of Ternary NiTiPd Alloys: *G. Bigelow*¹, S. Padula II¹, A. Garg¹, R. Noebe¹, D. Olson², (1)NASA Glenn Research Center, Cleveland, OH, (2)Colorado School of Mines, Golden, CO

Cobalt-Based Ferromagnetic High Temperature Shape Memory Alloys (SMAs): *I. Karaman*¹, H. E. Karaca¹, B. Basaran¹, Y. I. Chumlyakov², H. J. Maier³, (1)Texas A&M University, College Station, TX, (2)Siberian Physical Technical Institute, Tomsk, Russia, (3)University of Paderborn, Paderborn, Germany

Micro- and Macro-Strain Mapping of Shape Memory Alloys using DIC: *K. R. Gall*¹, L. C. Brinson², (1)Georgia Institute of Technology, Atlanta, GA, (2)Northwestern University, Evanston, IL

Full-Field Measurement of Strain and Transformation in Nitinol: *K. E. Perry*¹, P. E. Labossiere², (1)Echobio, LLC, Bainbridge Island, WA, (2)University of Washington, Seattle, WA

What is the Big Deal about the Af Temperature?: *M. H. Wu*, M. Polinsky, N. Webb, Memry Corporation, Bethel, CT

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Technical Program

Testing and Characterization of Large Diameter SMA Bars for Applications in Earthquake Engineering:

J. P. McCormick, R. DesRoches, Georgia Institute of Technology, Atlanta, GA

The Marriage of Mechanical Testing and Synchrotron

Radiation Micro-Diffraction: *A. Mehta*¹, N. Tamura², S. Robertson², V. Imbeni³, A. Pelton⁴, R. Ritchie², (1)Stanford Synchrotron Radiation Laboratory, Menlo Park, CA, (2)Lawrence Berkeley National Laboratory, Berkeley, CA, (3)SRI International, Menlo Park, CA, (4)Nitinol Devices & Components, Fremont, CA

Posters

- **Uniaxial Mechanical Characterization of Nitinol Tubing:** *S. Zhang*, E. Young, A. Mukherjee, Edwards LifeSciences, Irvine, CA
- **SMAq: A Novel Integrated Instrument for the Characterization of SMA Wires:** *M. F. Urbano*, A. Coda, R. Giannantonio, SAES Getters S.p.A, Lainate, Italy
- **Shape Memory Alloys NiTi Compositional Evaluation: A Multiple Analytical Approach Survey:** *M. F. Urbano*, C. Landoni, F. Perrotta, SAES Getters S.p.A, Lainate, Italy
- **Effects of Hydrogen on the Phases and Transition Temperatures of NiTi:** *A. Runciman*¹, K. C. Chen¹, A. R. Pelton², C. Trépanier², (1)California Polytechnic State University, San Luis Obispo, CA, (2)Nitinol Devices & Components, Fremont, CA
- **Comparison of a Video Extensometer Over a Clip-On Extensometer and Crosshead Motion as a Strain Measurement Technique for Testing Nitinol Specimens in Tension:** *M. Viveiros*¹, Z. C. Lin², (1)Instron Corporation, Norwood, MA, (2)Guidant Corporation, Santa Clara, CA
- **Realisation of SME at Ultrasonic Heating:** *V. V. Rubanik Jr.*², V. V. Rubanik¹, V. V. Klubovich¹, (1)Institute of Technical Acoustics, Vitebsk, Belarus, (2)Vitebsk State Technological University, Vitebsk, Belarus
- **Stress Relaxation of Linear Elastic NiTi:** *J. M. Crank*, Boston Scientific, Maple Grove, MN
- **DSC Response Factors:** *D. Steele*, Johnson Matthey, San Jose, CA

Session 3: Surface Processing and Biological Response

Monday, May 8, 2006 • 1:30-2:50 p.m.

Session Chair: *N. Shevchenko*, Forschungszentrum Rossendorfe, Dresden, Germany

Modification of NiTi Surface by Plasma Immersion Ion

Implantation: *N. Shevchenko*, M. F. Maitz, E. Richter, Institute of Ion Beam Physics and Materials Research, Forschungszentrum Rossendorf, Dresden, Germany

Cytokine Release from Human Leukocytes after Contact to NiTi: Influence of Ni Ion Concentration: *S. A. Esenwein*¹, D. Bogdanski¹, M. Wilhelm¹, M. Eppe², J. Wittsiepe¹, G. Muhr¹, O. Prymak², M. Pohl², M. Köller¹, (1)Ruhr University, Bochum, Germany, (2)University of Duisburg-Essen, Essen, Germany

Effect of Collagen on the Formation of Apatite-Collagen Composite Layer on the Surface of NiTi Shape Memory Alloy: *X. J. Yang*, Y. L. Cai, Z. D. Cui, Q. Wei, C. Y. Liang, Tianjin University, Tianjin, China

Surface Treatments for Nitinol Stents with Radiopaque Markers: *R. Steegmueller*, G. Siekmeyer, A. Schuessler, Admedes Schuessler GmbH, Pforzheim, Germany

Posters

- **Ion Implantation Treatments of Nitinol Alloys: New Approach to Improve the Biocompatibility:** *L. Yahia*¹, E. Delvecchio¹, A. Ferretto¹, S. Polizu¹, B. Terrault², (1)Ecole Polytechnique of Montreal, Montreal, QC, Canada, (2)University of Quebec, Varennes, QC, Canada
- **Surface Modification of TiNi Dental Implants by Ion- and Electron Beam Influence:** *L. L. Meisner*¹, A. I. Lotkov¹, B. P. Gritsenko¹, V. P. Rotshtein², K. V. Karlick², V. V. Rasdorskii³, V. A. Kopisova³, (1)Institute of Strength Physics and Materials Science of SB RAS, Tomsk, Russia, (2)Institute of High-Current Electronics of SB RAS, Tomsk, Russia, (3)Russian Research and Practice Medicine Center of SMI, Novokusnetsk, Russia
- **A Comparative Study on TiN/Ti, TiC/Ti, TiCN/Ti and ZrN/Zr Coatings Deposited on Ti-50.6at.%Ni Alloy by PHID:** *Y. F. Zheng*, Y. Cheng, Peking University, Beijing, China

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Technical Program

Session 4: Corrosion and Biocompatibility

Monday, May 8, 2006 • 3:10-4:50 p.m.

Session Chair: *T. Woods*, FDA Center for Devices & Radiological Health, Rockville, MD

An Assessment of ASTM F 2129 Test Results Comparing Nitinol to other Implant Alloys: *R. A. Corbett*, Corrosion Testing Laboratories, Inc., Newark, DE

Impact of Testing Methodology on Breakdown Potentials: *C. Warner*¹, *R. A. Corbett*², (1)*W. L. Gore & Associates*, Elkton, MD, (2)*Corrosion Testing Laboratories, Inc.*, Newark, DE

Electrochemical Behavior of Nitinol in Simulated Bile Solutions: *B. G. Pound*, Exponent, Menlo Park, CA

Effect of Fretting and Crevice Corrosion on the Performance of Stents: *C. Trépanier*¹, *X. Y. Gong*¹, *V. Schroeder*¹, *R. B. Grishaber*², *A. R. Pelton*¹, (1)*Nitinol Devices & Components*, Fremont, CA, (2)*Cordis Johnson and Johnson*, Warren, NJ

Analysis of the Efficiency of Different Treatments in Surface Passivation of NiTi: *S. A. Shabalovskaya*, Ames Laboratory, Drake University, Ames, IA

Posters

- **Corrosion Characterization of Nitinol Martensite and Austenite Phases:** *M. Denton*¹, *J. C. Earthman*², (1)*Edwards LifeSciences*, Irvine, CA, (2)*The Henry Samueli School of Engineering*, Irvine, CA
- **Morphological Characterization and Corrosion Resistance of TiNi Foams Obtained Via SHS Processing for Biomedical Applications:** *L. de Nardo*¹, *F. Brunella*¹, *G. Rondelli*², *S. Farè*¹, *P. Jardine*³, *A. Cigada*¹, *L. Yahia*⁴, (1)*Politecnico di Milano*, Milano, Italy, (2)*CNR-IENI*, Milano, Italy, (3)*Shape Change Technologies*, Thousand Oaks, CA, (4)*Polytechnique de Montréal*, Montreal, QC, Canada

Session 5: Thin Films, Powder, and Porous Materials

Tuesday, May 9, 2006: 8:30 • 11:30 a.m.

Session Chair: *D. S. Grummon*, Michigan State University, East Lansing, MI

High Temperature NiTiHf Shape Memory Thin Films Fabricated by Simultaneous Sputter Deposition from Elemental Targets: *S. Sanjabi*¹, *S. K. Sadrnezhad*¹, *Z. Barber*², (1)*Sharif University of Technology*, Tehran, Iran, (2)*Cambridge University*, Cambridge, England

Plastic Deformation of Sputtered NiTi Thin Films on Polyimide Substrates: *J. Foltz*, *D. S. Grummon*, *Y. Zhang*, Michigan State University, East Lansing, MI

NiTi Shape-Memory Thin Films: The Potential for Thermomechanical Data Storage Technology: *W. C. Crone*¹, *G. A. Shaw*², (1)*University of Wisconsin – Madison*, Madison, WI, (2)*National Institute of Standards and Technology*, Gaithersburg, MD

Fabrication and Micro-Structuring of Superelastic NiTi Thin Film by Magnetron Sputtering and Photoetching Technology: *H. Rumpf*, *V. Wipperfuhr*, *C. Zamponi*, *E. Quandt*, Research Center Caesar, Bonn, Germany

TiNi Thin Film Technology: An Update: *A. D. Johnson*¹, *V. Martynov*², (1)*TiNi Alloy Company*, San Leandro, CA, (2)*TiNi Aerospace*, San Leandro, CA

Recent Developments in Non-Planar Thin Film TiNi Technologies: *A. P. Jardine*, *A. Nguyen Le*, Shape Change Technologies LLC, Thousand Oaks, CA

Laser Annealing of Amorphous Ni-Ti Shape Memory Alloy Thin Films: *J. J. Vlassak*¹, *X. Wang*¹, *Y. Bellouard*², *Z. Xue*¹, (1)*Harvard University*, Cambridge, MA, (2)*Eindhoven University of Technology*, Eindhoven, Netherlands

TiNi-Base SMA Thin Film Microactuators and Related Science and Technology: *S. Miyazaki*, *M. H. Cho*, *M. M. Tomozawa*, *M. P. J. Buenconsejo*, *D. H. Y. Kim*, University of Tsukuba, Ibaraki, Japan

Posters

- **Characterization of As-Deposited Crystalline Thin Film NiTi:** *D. Bronfenbrenner*¹, *V. Radmilovic*², *S. McHugo*³, *A. Pelton*³, *R. Gronsky*¹, (1)*University of California*, Berkeley, CA, (2)*Lawrence Berkeley National Labs*, Berkeley, CA, (3)*Nitinol Devices & Components*, Fremont, CA
- **Characterization of Porous NiTi Alloys Produced by SHS:** *P. Bassani*², *C. Zanotti*¹, *P. Giuliani*¹, *F. Passaretti*², *A. Tuissi*², (1)*Consiglio Nazionale delle Ricerche*, Milano, Italy, (2)*Consiglio Nazionale delle Ricerche*, Lecco, Italy
- **Porous NiTi with Superelastic or Shape-Memory Property:** *D. Dunand*, *A. Bansiddhi*, *S. M. Oppenheimer*, *C. Greiner*, Northwestern University, Evanston, IL
- **Shock Damping Properties of SHS-Derived Porous TiNi:** *A. P. Jardine*, *G. Baure*, Shape Change Technologies LLC, Thousand Oaks, CA
- **Characterization and Fabrication of Electrodeposited Shape Memory MnCu Thin Films:** *G. Baure*, *A. P. Jardine*, Shape Change Technologies LLC, Thousand Oaks, CA
- **Crystallization of Amorphous Sputtered NiTi Thin Films:** *A. G. Ramirez*, Yale University, New Haven, CT

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Technical Program

- **Microstructure, Mechanical Properties and Phase Transformation Behaviors of Porous NiTi Shape Memory Alloy Fabricated by Combustion Synthesis:** C. Y. Chung², C. L. Chu¹, S. L. Wu², K. W. K. Yeung³, P. K. Chu², (1)Southeast University, Nanjing, China, (2)City University of Hong Kong, Hong Kong, China, (3)The University of Hong Kong, Hong Kong, China
- **Oxidation Behavior on the NiTi Thin Film /Substrate Interface:** Y. Li¹, L. Li¹, F. Meng², Y. Wang², (1)Tsinghua University, Beijing, China, (2)Jilin University, Changchun, China
- **In-Situ Study of the Preferential Orientation of Magnetron Sputtered Ni-Ti Thin Films as a Function of Bias and Substrate Type:** R. M. S. Martins¹, N. Schell¹, R. J. C. Silva², K. K. Mahesh², M. Beckers¹, A. Mücklich¹, F. M. Braz Fernandes², (1)Forschungszentrum Rossendorf, Dresden, Germany, (2)CENIMAT, Monte de Caparica, Portugal
- **Ion Beam Projection Techniques for Locally Inducing Intermixing in Ni-Ti Thin Films:** A. Dietzel¹, Y. Bellouard¹, W. Bruenger², X. Wang³, J. J. Vlassak³, (1)Technische Universiteit Eindhoven, Eindhoven, Netherlands, (2)Fraunhofer Institute, Itzehoe, Germany, (3)Harvard University, Boston, MA

Session 6: Alloy Production and Processing

Tuesday, May 9, 2006 • 8:30-11:30 a.m.

Session Chair: F. Sczerzenie, Special Metals Corporation, New Hartford, NY

Fabrication of Single-Phase NiTi-Based SMA by Vapor Phase Calciothermic Reduction (VPCR) Process: B. Bertheville, Nickel Industrial Titanium Innovative Group, NITIG, Sion, Switzerland

Improvement of Mechanical Properties of Powder Metallurgical NiTi by Reduction of Impurity Phases:

J. Mentz, M. Bram, H. P. Buchkremer, D. Stoeber, Forschungszentrum Juelich, Juelich, Germany

Solid Free-Form Fabrication of NiTi Shape Memory Alloys: J. E. Bidaux, S. Martinerie, E. Carreño-Morelli, University of Applied Sciences of Western Switzerland, Sion, Switzerland

Superelastic Porous NiTi Shape Memory Alloy Fabricated by Capsule-Free Hot Isostatic Pressing Process: B. Yuan¹, C. Y. Chung², X. P. Zhang¹, M. Zhu¹, (1)South China University of Technology, Guangzhou, China, (2)City University of Hong Kong, Hong Kong, China

The Effect of Processing on the Microstructure, Properties, and Shape Memory Behavior of a NiTi-20Pt Alloy:

R. Noebe¹, S. Draper¹, G. Bigelow¹, B. Lerch¹, N. Penney¹, S. Padula II¹, J. Brown², (1)NASA Glenn Research Center, Cleveland, OH, (2)Dynalloy, Inc., Costa Mesa, CA

Friction Stir Welding of Nitinol: B. London¹, J. Fino², A. Pelton², C. Fuller³, M. Mahoney³, (1)California Polytechnic State University, San Luis Obispo, CA, (2)Nitinol Devices & Components, Fremont, CA, (3)Rockwell Scientific, Thousand Oaks, CA

Effect of Melting Process Parameters on Martensitic NiTi Ingots Properties: L. Toia¹, A. Coda¹, G. Santella², (1)SAES Getters S.p.A, Lainate, Italy, (2)SAES Advanced Technologies S.p.A., Avezzano, Italy

Lost-Wax Process for Ti-Ni Shape Memory Alloys:

K. Kitamura¹, T. Kuchida², Y. Sawada², T. Inaba², M. Tokuda², Y. Yoshimi³, (1)Nagano National College of Technology, Nagano, Japan, (2)Mie University, Tsu, Japan, (3)Yoshimi Inc., Obu, Japan

Posters

- **The Effect of Continuous Straightening Anneal on Superelastic Nitinol Tubing for Stent Applications:** P. Poncin¹, B. Gruez¹, P. Comte-Gaz¹, J. L. Proft², (1)Minitubes, Grenoble, France, (2)Metallurgical Solutions, Redwood City, CA
- **Superelastic and Shape Memory Single Crystal CuAlNi: Fabrication and Applications:** V. Martynov¹, M. D. Bokaie¹, A. D. Johnson², G. R. Gray², (1)TiNi Aerospace, San Leandro, CA, (2)TiNi Alloy Company, San Leandro, CA
- **Microscopic Evolution of Solidification Structures in Fe-Mn-Si-Cr Shape Memory Alloy in Centrifugal Casting:** H. Kubo¹, R. Sahara², S. Farjami², (1)Kanto Polytechnic University, Oyama, Japan, (2)Tohoku University, Sendai, Japan
- **The Effect of Cold Work and Heat Treatment Parameters on the Austenite Finish Temperature of Nitinol:** M. J. Drexel¹, G. S. Selvaduray¹, A. R. Pelton², (1)San Jose State University, San Jose, CA, (2)Nitinol Devices & Components, Fremont, CA
- **Mechanical Properties and Fatigue of Laser Welded Nitinol Joints:** A. Schuessler, M. Strobel, R. Steegmueller, Admedes Schuessler GmbH, Pforzheim, Germany
- **Obtaining Thermomechanical Couplings by Welding:** V. V. Rubanik², M. A. Husainov¹, V. V. Rubanik Jr.³, V. A. Andreev⁴, (1)Novgorod State University, Veliki Novgorod, Russia, (2)Institute of Technical Acoustics, Vitebsk, Belarus, (3)Vitebsk State Technological University, Vitebsk, Belarus, (4)Industrial Center "Mateks Ltd.", Moscow, Russia

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Technical Program

Session 7: Actuators and Other Non-Medical Applications

Tuesday, May 9, 2006 • 1:30-2:50 p.m.

Session Chair: *J. Brown*, Dynalloy, Inc., Costa Mesa, CA

NiTiFe Alloys for Low Temperature Thermal Switches: Alloy Development and Prototype Testing: *R. Vaidyanathan*, University of Central Florida, Orlando, FL

Biasing the Thermo-Mechanical Recovery of NiTi Thin Films Through Ion Implantation: A Technique used to Fabricate Novel Micro-Actuators: *T. B. LaGrange*¹, R. Gotthardt², D. S. Grummon³, (1)Lawrence Livermore National Laboratory, Livermore, CA, (2)Swiss Institute of Technology (EPFL), Lausanne, Switzerland, (3)Michigan State University, East Lansing, MI

Shape Memory Actuators for Automotive Application: *L. Toia*¹, F. Butera², S. Alaquá², A. Coda¹, G. Vergani¹, (1)SAES Getters S.p.A, Lainate, Italy, (2)Centro Ricerche FIAT, Orbassano, Italy

The Unbearable Lightness of the Cube: Using SMA to Express Lightness, Movement and Memory in Sculptures: *R. Gotthardt*¹, E. Krähenbühl², (1)Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, (2)Atelier Romainmôtier, Romainmôtier, Switzerland

Posters

- **Numerical Model for Shape Memory Alloy Actuators:** *D. Palmeri*, A. Barcellona, F. Alonge, R. Bissanti, University of Palermo, Palermo, Italy
- **Characterization Methods of Nitinol Wires for Actuation:** *L. Toia*, A. Coda, M. Urbano, SAES Getters S.p.A, Lainate, Italy
- **Two Way Shape Memory Effect in NiTi Alloy: Experimental Measurements and Numerical Simulations:** *A. Falvo*, F. M. Furguele, C. Maletta, University of Calabria, Arcavacata Rende (CS), Italy
- **Use of Shape Memory Alloys to Mitigate Power Transmission Line Sagging:** *M. Shirmohamadi*¹, D. Kopperdahl¹, R. Gray², (1)Material Integrity Solutions, Inc., Berkeley, CA, (2)Power Transmission Solutions, Inc., Berkeley, CA
- **Study on Potential Applications of Binary and Ternary Shape Memory Alloys:** *P. Maheshwari*, R. Chauhan, V. Singh, Punjab Engg. College, Chandigarh, India
- **Experimental and Finite Element Analysis of Superelastic Shape Memory Alloy Dampers:** *P. Terriault*¹, P. Lafortune¹, V. Brailovski¹, V. Torra², C. Fischer-Rousseau¹, (1)Ecole de Technologie Supérieure, Montreal, QC, Canada, (2)Polytechnical University of Catalonia, Barcelona, Spain

- **Actuators and Drives Based on CuAlNi Shape Memory Single Crystals:** *V. Nikolaev*¹, S. Pulnev¹, A. Priadko², I. Vahhi², A. Bhattacharyya³, (1)Ioffe Physico-Technical Institute of the Russian Academy of Sciences, St.Petersburg, Russia, (2)Saint-Petersburg State Polytechnic University, St.Petersburg, Russia, (3)University of Arkansas, Little Rock, AR
- **Scaling Effect on Ni-Ti Thin-Film Based Microstructures:** *Y. Bellouard*¹, X. Wang², J. J. Vlassak², (1)Technische Universiteit Eindhoven, Eindhoven, Netherlands, (2)Harvard University, Boston, MA
- **Large-Scale Testing of Shape Memory Alloy Recentering Devices for Improving the Seismic Response of Bridges:** *J. Padgett*¹, R. DesRoches¹, D. E. Hodgson², (1)Georgia Tech, Atlanta, GA, (2)Nitinol Technology, Inc., Mountain View, CA

Session 8: Thermal Mechanical Fatigue

Tuesday, May 9, 2006 • 1:30-2:50 p.m.

Session Chair: *H. Sehitoglu*, University of Illinois, Urbana, IL

Thermomechanical Behaviors of Ultrathin NiTi Wires for Application in Smart Textiles: *P. Sittner*¹, V. Novak¹, L. Heller¹, M. Landa², P. Sedlak², (1)Institute of Physics Academy of Sciences of the Czech Republic, Prague, Czech Republic, (2)Institute of Thermomechanics Academy of Sciences of the Czech Republic, Prague, Czech Republic

The Rational use of Shape Memory Alloys as Actuators or Dampers: *C. LExcellent*, FEMTO-ST, Besançon, France

Multiple Stress-Plateaus During Complex Mechanical Cycling of Pseudo Elastic NiTi Wires: *M. F. X. Wagner*, G. Eggeler, Ruhr-University Bochum, Bochum, Germany

Mechanical Hysteresis in Single Crystal Shape Memory Alloys: *H. Sehitoglu*¹, R. F. Hamilton¹, C. Efstathiou¹, Y. I. Chumlyakov², H. J. Maier³, (1)University of Illinois, Urbana, IL, (2)Siberian Physical Technical Institute, Tomsk, Russia, (3)University of Paderborn, Paderborn, Germany

Posters

- **The Effect of Partial Transformation Cycling on the Fatigue Life of SMA Actuators:** *D. Kopperdahl*, M. Shirmohamadi, Material Integrity Solutions, Inc., Berkeley, CA
- **Cyclic Behavior of Nano-Grained Superelastic Nitinol Tubing:** *X. Y. Gong*¹, T. Zhao², Y. Jiang², (1)Nitinol Devices & Components, Fremont, CA, (2)University of Nevada, Reno, NV
- **Some Experiments on Superelastic Nickel-Titanium Shape Memory Alloys under Cyclic Loads:** *M. Schlaegel*, University of the Federal Armed Forces Munich, Neubiberg, Germany

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Technical Program

Session 9: Exemplary Applications

Tuesday, May 9, 2006 • 3:10-4:30 p.m.

Session Chair: *M. H. Wu*, Memry Corporation, Bethel, CT
Challenges in the Design and Manufacturing of the First Generation of Minimally Invasive Nitinol-Based Implants for Segmental Pulmonary Applications: *C. Finger*, B. J. Shuman, S. Yi, Spiration Inc., Redmond, WA

Shape Memory Alloy Position Sensor for Feedback Control of Active Catheter: *A. T. Tung*, B. H. Park, D. Liang, Stanford University, Stanford, CA

Characterization of Nickel-Rich Nitinol Alloys for Actuator Development: *J. Mabe*¹, F. T. Calkins¹, R. T. Ruggeri¹, C. J. Yu², (1)The Boeing Company, Seattle, WA, (2)NAVAIR-Naval Air Systems Command, Patuxent River, MD

Experimental Testing of Large Diameter Shape Memory Alloys: *C. J. Black*¹, I. D. Aiken¹, R. Krumme², J. Hayes³, S. Sweeney³, (1)Seismic Isolation Engineering, Inc., Oakland, CA, (2)E*Sorb Systems, Berkeley, CA, (3)U.S. Army CERL, Champaign, IL



Session 10: Device Modeling and Testing

Tuesday, May 9, 2006 • 3:10-4:30 p.m.

Session Chair: *K. E. Perry*, Echobio, LLC, Bainbridge Island, WA

Finite Element Modeling of In-Vitro Test Methods for Radial Force: *P. E. Labossiere*¹, K. E. Perry², (1)University of Washington, Seattle, WA, (2)Echobio, LLC, Bainbridge Island, WA

Modelling a Nitinol Device for the Repair of Abdominal Aortic Aneurysms: *E. McCummiskey*¹, W. M. Dempster¹, D. H. Nash¹, T. Ashton², D. Stevenson², (1)University of Strathclyde, Glasgow, United Kingdom, (2)Vascutek Terumo, Inchinnan, United Kingdom

Modeling and Testing of a New Sternal Closure Device using Tubular Mesh-Like Superelastic Nitinol Structure: *Y. V. Baril*¹, V. Brailovski¹, P. Terriault¹, R. Cartier², (1)Ecole de Technologie Supérieure, Montreal, QC, Canada, (2)Montreal Heart Institute, Montreal, QC, Canada

A Study of Anisotropy of Nitinol and Radiopaque Nitinol Hypotube: *Z. C. Lin*, D. Mackiewicz, B. Anukhin, H. M. Hsiao, K. Pike, Guidant Corporation, Santa Clara, CA

Posters

- **Microstructural Characterization of Nitinol Stents:** *M. H. Wu*⁵, A. Toro¹, W. Van Geertruyden², W. Z. Misiolek³, X. Han⁴, (1)National University of Colombia, Medellin, Colombia, (2)EMV Technologies, LLC, Bethlehem, PA, (3)Lehigh University, Bethlehem, PA, (4)Beijing University of Technology, Beijing, China, (5)Memry Corporation, Bethel, CT
- **Design Principles of Shape Memory Devices for Compression Anastomosis in the Digestive System:** *L. A. Monassevitch*, N. BenDov-Laks, N. Tyagunov, A. Perle, S. Lelcuk, D. Kopelman, A. Szold, M. Arad, NiTi Medical Technologies Ltd., Netanya, Israel
- **Thermoelastic Shape Memory Modeling of Medical Devices with FEA:** *T. K. Parnell*¹, S. Choudhry², T. J. Lim³, (1)PEC – Parnell Engineering & Consulting, Sunnyvale, CA, (2)MSC Software, Redwood City, CA, (3)Stanford University, Stanford, CA
- **Shape Memory Alloy Staple for Idiopathic Scoliosis:** *K. Saidane*, C. E. Aubin, Ecole Polytechnique, Montreal, QC, Canada
- **Mechanical Analysis of Various Contemporary Ni-Ti Alloy Endodontic Instruments through FEM:** *Y. F. Zheng*, X. J. Xu, Peking University, Beijing, China
- **Mechanical Testing Devices for Characterizing Stents:** *J. Simons*, D. Schockey, SRI International, Menlo Park, CA

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Technical Program

Session 11: Metallurgical Fundamentals

Wednesday, May 10, 2006 • 8:30 -9:50 a.m.

Session Chair: *G. Eggeler*, Ruhr University, Bochum, Germany

Biomedical Ni-Free Ti-Nb Based Shape Memory and Superelastic Alloys: *H. Y. Kim*¹, *H. Hosoda*², *S. Miyazaki*¹, (1)University of Tsukuba, Ibaraki, Japan, (2)Tokyo Institute of Technology, Yokohama, Japan

EBSD Microstructural Characterization of Ni_{50.8}Ti_{49.2} Shape Memory Alloy: *A. Tuissi*, *P. Bassani*, *F. Passaretti*, Consiglio Nazionale delle Ricerche, Lecco, Italy

On the Effect of Coherent Ni₄Ti₃-Precipitates in Ni-Rich NiTi Single Crystals on Martensitic Phase Transformations: *G. Eggeler*, Ruhr-University Bochum, Bochum, Germany

Shape Memory and Pseudoelasticity in FCC Metal Nanowires: *K. Gall*¹, *J. Zimmerman*², *H. Park*³, (1)Georgia Institute of Technology, Atlanta, GA, (2)Sandia National Laboratory, Livermore, CA, (3)Vanderbilt University, Nashville, TN

Posters

- **Two Factors Influencing the Transformation Temperature in Ni₄₇Ti₄₄Nb₉ Shape Memory Alloy:** *W. Jin*, Institute of Metal Research, Chinese Academy of Sciences, Shenyang, China
- **Investigation of Luders-Like Deformation Bands in NiTi Shape Memory Alloys:** *X. Han*¹, *S. Mao*¹, *Z. Zhang*¹, *M. H. Wu*², (1)Beijing University of Technology, Beijing, China, (2)Memry Corporation, Bethel, CT
- **Effect of Thermomechanical Treatments on the Microstructure of NiTi Wires: a TEM Study:** *A. Coda*¹, *S. Gialanella*², *G. Ischia*², *L. L. Toia*¹, (1)SAES Getters S.p.A, Lainate, Italy, (2)Università Degli Studi di Trento, Trento, Italy
- **Elastic Interaction of the Precipitate with Martensite in Fe-Mn-Si-Cr Shape Memory Alloy:** *S. Farjami*¹, *H. Kubo*², (1)Tohoku University, Sendai, Japan, (2)Kanto Polytechnic University, Oyama, Japan
- **Lattice Induced Strain due to Phase Transition from Austenite to Martensite:** *X. Y. Gong*, *M. Bartning*, Nitinol Devices and Components, Fremont, CA

Session 12: Theory for Design and Discovery

Wednesday, May 10, 2006 • 10:10-11:30 a.m.

Session Chair: *K. Bhattacharya*, California Institute of Technology, Pasadena, CA

A Micromechanics Inspired Constitutive Model for Shape-Memory Alloys: *K. Bhattacharya*, *A. Sadjadpour*, *S. Daly*, California Institute of Technology, Pasadena, CA

Method for Producing Low Hysteresis TiNiX Shape Memory Alloys: *Z. Zhang*, *R. D. James*, University of Minnesota, Minneapolis, MN

Shape Memory Alloy Honeycombs: Experimental Characterization and Design Opportunities: *J. A. Shaw*¹, *C. Churchill*¹, *D. S. Grummon*², *J. Foltz*², (1)The University of Michigan, Ann Arbor, MI, (2)Michigan State University, East Lansing, MI

Utility of Analytic Lower Bounds for Practical Stress Analysis: *S. Govindjee*, University of California, Berkeley, CA

Poster

- **Challenges and Progress in the Development of High-Temperature Shape Memory Alloys Based on NiTiX Compositions for High-Force Actuator Applications:** *S. Padula II*, *G. Bigelow*, *A. Garg*, *R. Noebe*, NASA Glenn Research Center, Cleveland, OH



Photo courtesy of C. Chu and R.D. James

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Technical Program

Session 13: Future Directions and Panel Discussion

Thursday, May 11, 2006 • 8:30-9:50 a.m.

Session Chair: *T. Duerig*, Nitinol Devices & Components, Fremont, CA

Superelastic NiTi Interlayers for Improving the Wear Resistance of Hard Coatings on Soft Substrates: *Y. Zhang*¹, D. S. Grummon¹, Y. T. Cheng², J. A. Shaw³, (1)Michigan State University, East Lansing, MI, (2)General Motors, Warren, MI, (3)The University of Michigan, Ann Arbor, MI

Structure, Phase Transformation and Mechanical Properties in Nanostructured TiNi Obtained by Severe Plastic Deformation: *K. Tsuchiya*¹, A. Hosokawa¹, M. Katahira¹, Y. Todaka¹, M. Umemoto¹, K. Morii², (1)Toyohashi University of Technology, Toyohashi, Japan, (2)Daico Steels, Co., Ltd., Nagoya, Japan

Carbon and Oxygen Levels in Nitinol Alloys and the Implications for Medical Device Manufacture and Durability: *N. B. Morgan*, J. DiCello, M. McGrane, C. Trepanier, Nitinol Devices and Components, Fremont, CA

Posters

- **Vibration Characteristics of Shape Memory Composites:** *E. P. Da Silva*, V. Alves, Universidade de Brasília, Brasília, Brazil
- **Transient Liquid Formation in the NiTi-Nb System: A New Joining Method for Nitinol:** *K. B. Low*¹, D. S. Grummon¹, J. Foltz¹, J. A. Shaw², (1)Michigan State University, East Lansing, MI, (2)The University of Michigan, Ann Arbor, MI

Session 14: Medical Applications – A Joint Session with the Society for Medical Innovation and Technology

Thursday, May 11, 2006 • 10:10-11:30 a.m.

Session Chairs: *A. Melzer*, University of Applied Sciences, Gelsenkirchen, Germany; *H. Fischer*, Endosmart GmbH, Stutensee, Germany

The V-Crown – A Novel Proximal NiTi-Structure for Thoracic Aortic Arch Stentgrafts: *R. Kaufmann*¹, M. Mertmann², (1)Jotec GmbH, Hechingen, Germany, (2)Memory-Metalle GmbH, Weil am Rhein, Germany

Additional presentations by SMIT to be announced.

Posters

- **Design and Clinical Applications of Proximal Humerus Memory Connector:** *C. Zhang*, S. Xu, Changhai Hospital, The Second Military Medical University, Shanghai, China
- **The Direct Electric Resistance Heat Treatment Method for Bending Nickel Titanium Wires in Orthodontics:** *A. Teramoto*, GAC Interantional, Mexico City, Mexico
- **Making Intrauterine Contraceptives from TiNi Alloys:** *V. G. Dorodeiko*¹, V. V. Rubanik², (1)Medical Enterprise “SIMURG”, Vitebsk, Belarus, (2)Institute of Technical Acoustics, Vitebsk, Belarus
- **Clinical Applications of Shape Memory Alloys Based on NiTi as Implant Materials – Possibilities in Trauma and Orthopaedic Surgery:** *S. A. Esenwein*¹, D. Bogdanski¹, M. Köller¹, L. Krone², M. Eppler³, G. Muhr¹, (1)Ruhr University of Bochum, Bochum, Germany, (2)Research Centre Jülich, Jülich, Germany, (3)University of Duisburg-Essen, Essen, Germany



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Educational Workshop

Nitinol – Beyond the Fundamentals

Date: Sunday, May 7, 2006

Time: Registration/breakfast: 8:00 a.m.

Course: 8:45 am - 4:45 p.m.

Location: Monterey Marriott Hotel*

This full-day workshop will build on previous SMST/ASM Nitinol courses. Although it will include a brief introduction to each topic, the aim of the course will be to advance the attendee's knowledge through

presentations delivered by experts in the field on specific topic areas.

This program will address important and interesting topics for anyone

working with Nitinol; these topics will serve as excellent precursors to the SMST 2006 Conference sessions, which start the next day.

Workshop Outline:

Properties and Processing: Dr. Neil Morgan, Nitinol Devices and Components, a J&J Company

Advanced Phase and Composition Effects: Dr. Tom Duerig, Nitinol Devices and Components, a J&J Company

Finite Element Analysis and Modeling: Dr. Ken Perry, ECHOBIO, LLC

Fatigue and Fracture: Dr. Brad James, Exponent Failure Analysis Associates

Corrosion and Biocompatibility: Dr. Ramakrishna Venugopalan, Codman, a J&J Company

Thin Films: Prof. Dave Grummon, Michigan State University
The workshop includes a handout of the presentation materials, continental breakfast, lunch and breaks.

* Since rooms are only available at the Asilomar Conference Grounds starting on the Sunday evening, bedrooms are being held at a special ASM/SMST rate at the Monterey Marriott for Saturday, May 6. Please check the SMST 2006 website for details.

All registered workshop participants will receive additional course details.



Social Events

The selection of social programming during the 2006 SMST Conference is as varied as the region in which the event is being held. From an outdoor bonfire, to a reception and dinner among hundreds of thousands

of marine species, this SMST Conference offers you myriad opportunities to network among like-minded professionals in a relaxed setting.

Sunday Evening Welcome Reception

Join us at your leisure to meet with your colleagues as people arrive and get settled at Asilomar.



Monday Evening Bonfire

Enjoy a night around a roaring campfire, enjoying libations and "s'mores", just steps from the Pacific Ocean.



Wednesday – Afternoon Free Time/ Evening Aquarium Reception and Dinner

Imagine - all afternoon has been left for you to explore the area around the Asilomar grounds. Some will prefer to take a shuttle bus into the town of Monterey, to visit Cannery Row or Fisherman's Wharf. Others will choose to browse through the exhibits of the Monterey Bay Aquarium, which includes over 300,000 marine plants and animals, or explore the National Steinbeck Center.

As evening comes, Conference attendees will convene at the Monterey Bay Aquarium, where a portion of the building has been reserved for you and your colleagues to enjoy food and drink around a myriad of aquatic lifeforms. Our section of the building includes the world-famous exhibit "Jellies: Living Art".



Thursday Barbeque Lunch

As the closing function of the 2006 Conference, this barbeque takes place outside, just a short walk from the Ocean. This is a perfect place to wind down, review everything you have learned during the week, and make plans to meet old and new friends and colleagues at the next SMST event.



*Photos courtesy of the Monterey County Convention and Visitors Bureau

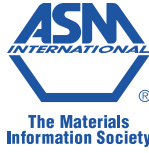
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Sponsorship Opportunities



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May 7-11, 2006
Asilomar Conference Grounds
Pacific Grove, California

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■ Level 1 Sponsorship \$2,000

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- Listing of your company or institution name on special onsite signage recognizing your group's support
- Ability to include (2) pieces of literature in delegates' registration bags
- Ability to include promotional items to give away to delegates (pens, mouse pads, etc. with your company name – price of promotional items not included; items to receive pre-approval by ASM International)
- Banner advertisement on the SMST-2006 event website

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 - Tuesday Product Exhibit Reception (one available)
 - Wednesday Banquet (three available)
 - Thursday Beach Barbeque (one available)
 - Coffee Breaks during technical sessions (one available)
2. Listing of your company or institute name on special signage at the opening networking event and at the sponsored indoor events (your sponsorship will be announced prior to or during outdoor events).

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- ☐ Coffee Breaks during technical sessions (one available)

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SMST and ASM International are incorporated as not-for-profit educational organizations. As such, your contribution to SMST may be tax deductible. Please consult your tax advisor.

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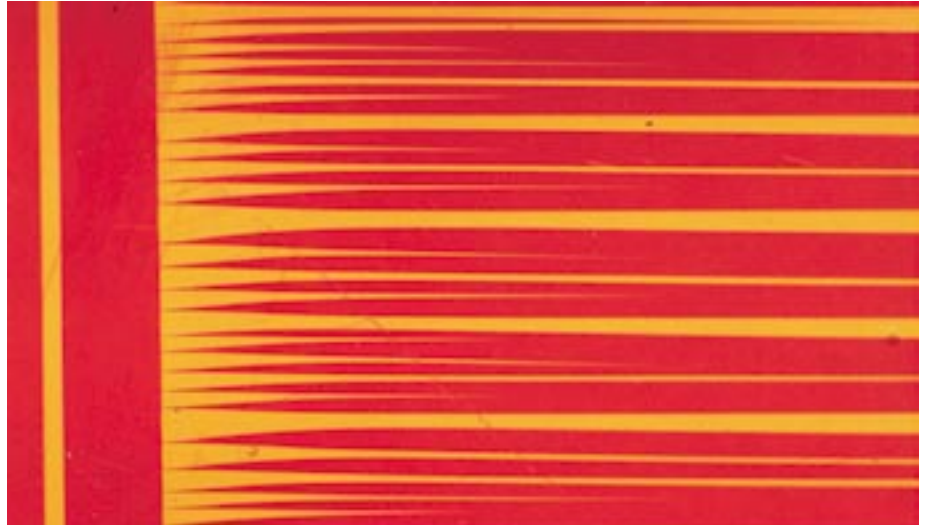
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Product Exhibition

The conference will provide an opportunity to exhibit and examine various products made from shape memory alloys. Providers of related services such as finite element analysis or testing are also being invited to participate. A reception will be held for conference attendees during the exhibition hours on Tuesday evening.

Space is selling quickly, and we expect to be sold out well in advance of the conference. Attendees wishing to exhibit materials, products or services should contact Jeff Simpson at jsimpson1@ndcus.jnj.com at their earliest opportunity.

*Photo courtesy of
C. Chu and R.D. James*



Meet the Authors

All poster authors will be invited to display their work in a central location during a Monday evening poster viewing session. Conference delegates are invited to use this opportunity to discuss poster presentations in person, and have their questions answered.



SMIT 2006

Society for Medical Innovation and Technology

18th International Conference

May 11-14, 2006 • Monterey, California



The 18th International Conference of the Society for Medical Innovation and Technology (SMIT) will be held May 11-14, 2006, at the Asilomar Conference Grounds, immediately following the 2006 SMST Conference.

Preliminary Program:

Thursday, May 11

- SMST Joint Session on the Use of Nitinol in Medicine
- 3rd "Hands On" Seminar on Nitinol Based Interventional and Surgical Devices
- Special Focus Sessions
 - DARPA Advanced Research
 - TATRC Advanced Technology
- Special Lecture - Innovations in Innovation

Friday, May 12

- 1st Symposium on MR Safety and Compatibility of Medical Devices, Interventional and Intraoperative MRI
- John Wickham Lecture
- Emerging Technologies Session
- Special Focus Sessions – Imaging/Heart/Spine/MEMS and Nano
- Face to Face – Total Body Scanning
- Taskforce SMIT Endoluminal

Saturday, May 13

- 1st Symposium on Image Guided Robotics
- Special Focus Sessions – Reuse of Disposables/Urology
- SMIT TECH TRAIN
- Surgical Technologies
- Imagine and See

Sunday, May 14

- Pacific Rim Innovations
- SMIT Award Sessions



For further SMIT 2006 Conference details, please visit the conference website at www.smit2006.com.

General Information

Directions to Asilomar Conference Grounds

From the North (San Francisco Bay Area or San Jose)

Asilomar is approximately 120 miles south of downtown San Francisco (about 105 miles from San Francisco International Airport) and about 75 miles south of San Jose.

- Take 101 south to 156 West.
- Take 156 West to highway 1 South, through Monterey to the Pebble Beach / Pacific Grove exit
- Turn right on Holman Highway / 68 West.
- Stay on Highway 68 West/Holman Highway for 3.5 miles until it becomes a city street called Forest Avenue.
- Continue on Forest Avenue for about 1 mile. Make a left turn onto Sinex Avenue. In just under 1 mile, Sinex Avenue ends right at the front gates to Asilomar.

From the South (Los Angeles, Santa Barbara, or San Luis Obispo)

Asilomar is approximately 325 miles from downtown Los Angeles (about 310 miles from LAX).

- Take 101 North through Salinas to 156 West.
- Take 156 West to highway 1 South, through Monterey to the Pebble Beach / Pacific Grove exit, and highway 68 West. For about 3-1/2 miles you will then be on a portion of Highway 68 West that is also called the Holman Highway. Stay on Highway 68 West/Holman Highway until it becomes a city street called Forest Avenue.
- Continue on Forest Avenue for about 1 mile and make a left turn onto Sinex Avenue. In just under 1 mile, Sinex Avenue ends right at the front gates to Asilomar.

From the East (Salinas)

- Take Highway 68 West to Highway 1 South to Highway 68 West to Pacific Grove.
- Just past the Monterey Peninsula Airport, Highway 68 West overlaps Highway 1 for about 5 or 6 miles. Stay on Highway 68 West/Highway 1 and take the Pacific Grove exit. For about 3-1/2 miles you will then be on a portion of Highway 68 West that is also called the Holman Highway. Stay on Highway 68 West/Holman Highway until it becomes a city street called Forest Avenue.
- Continue on Forest Avenue for about 1 mile and make a left turn onto Sinex Avenue. In just under 1 mile, Sinex Avenue ends right at the front gates to Asilomar.

Airport Transportation

Asilomar Conference Grounds are accessible from three airports. Driving times are as follows: 15 minutes from Monterey, 75 minutes from San Jose, and 2 hours from San Francisco. The following transportation services are available. (Noted costs are subject to change without notice.)

- **Public Transportation:** The Monterey-Salinas Transit (MST) bus system stops at the Monterey airport. The total trip is about 30 minutes. Take any number Monterey-bound bus. Call MST for detailed schedule information 831-899-2555. (One-way rate is \$1.75.)
- **Taxi:** From Monterey Airport, Fares are \$20 - \$25 one-way
- **Shuttle:** Monterey Salinas Airbus. See website for more details. www.montereyairbus.com or call 831-373-7777 (reservations highly recommended)

Proceedings

Proceedings of the *International Conference on Shape Memory and Superelastic Technologies* will be available after the event. Each full conference registrant will receive a copy of the proceedings. If you are not a full conference registrant, you may purchase a copy of the proceedings by completing the appropriate section on the registration form.

Conference Attire

Proper attire for the conference will be business casual. Asilomar is located on the shore of the central coast of California where the weather is mild year-round. However, coastal weather varies throughout the day. It may start out being foggy in the early morning, become warmer and sunny around noon, turn cool and breezy later in the afternoon, and end up a little chilly in the evening. Throughout most of the year, Asilomar's midday temperatures average about 60°F/15°C. We recommend that you bring a warm sweater or lightweight jacket.

Language

All presentations at the conference will be presented in English. Simultaneous translation will not be provided.

Travel to the United States

As a service to our conference attendees, ASM International® has established an ongoing relationship with the U.S. Department of State, Visa Services Division to assist you in obtaining a visa in order to attend an ASM event. We provide them with a detailed description of each of our events by dates and location which are then added to their Intranet Listing of Conferences being held throughout the United States where foreign attendance is expected. This intranet listing – where our events are clearly listed – is made available to all U.S. embassies and consulates worldwide to use in processing visas. It is our hope that this will help expedite your visa application. However, we must still issue a strong caution that visa applications should be submitted for processing as early as possible (but absolutely no later than 60 days prior to travel). Please visit our website for additional information.

Policy on Audio and Video Recording of Technical Paper Presentation/Sessions

ASM International reserves the right to any audio and video reproduction of presentations at every ASM technical session. Recording of sessions (audio, video and still photography, etc.) intended for personal use, distribution, publication, or copyright without the express written consent of ASM and the individual authors is strictly prohibited.

Policy on Cellular Phone Usage:

In consideration of fellow event attendees and presenters, ASM International kindly requests your cooperation in minimizing disturbances which may occur during technical sessions. We ask that cellular phones or other electronic devices be placed in "silent mode" while you are in the meeting rooms. Please step outside the meeting room if you need to have a conversation.

Attendees with Disabilities

In accordance with the Americans with Disabilities Act (ADA) of 1990, ASM International and the Asilomar Conference Grounds are striving to accommodate all of our guests with special needs. If a disability requires that you have access to modified housing, transportation or have other needs, please inform the hotel when making your reservation. Also check the box on the Conference Registration Form when making your arrangements and you will be contacted to accommodate any special requests.

To Contact ASM International

Mailing Address: ASM International, Customer Service Center,
Materials Park, Ohio 44073

Telephone: Toll-free 1-800-336-5152, ext. 6 or 1-440-338-5151, ext. 6

Fax: 1-440-338-4634

E-mail: Customer.Service@asminternational.org

Website: www.asmiinternational.org

For more information and to register, visit the web at:

www.asmiinternational.org/shape

Housing Information



SMST Housing Form

#21J3IB

May 7-11, 2006

Four Nights, Full-time participation only



The International Organization on
**Shape Memory and
Superelastic Technologies**

An Affiliate Society of ASM International®

Nestled along the shoreline of California's famed Monterey Peninsula, Asilomar is a tranquil ocean front retreat cradled by forests and white sand beaches. The Asilomar Conference Grounds is an exciting place to visit, with its unique blend of nature, architecture, and history. Asilomar offers 107 extraordinary acres of forests, dunes, and coastline situated right on the Monterey Bay National Marine Life Sanctuary.

Attendee Information

Last Name: _____

First Name: _____

Address: _____

City/State/Zip: _____

Country: _____

Business Phone: _____

Home Phone: _____

Fax: _____

E-mail: _____

Disability Access Requirements: _____

Credit Card Payment Information

Fax completed form to 831-642-4262

☐ Visa ☐ MasterCard ☐ Amex

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Expiration Date:

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Cardholder Signature: _____

Asilomar will bill your credit card upon receipt and confirmation sent.

Housing Information

Guest rooms are assigned on first come, first served basis. Rates are per person. **One form per person or family.** Please number choices in order of preference. If your choice is not available you will be assigned based on availability and the appropriate charge will apply.

Meals and applicable taxes included in rates:

Standard Single		Historic Single	
	\$715.70 (Limited)		\$592.50 (Limited)
Standard Double		Historic Double	
	\$442.90 each		\$398.90 each
Standard Triple/Quad		Youth (Ages 3-17)	
	\$346.10 each		\$256.26 each

☐ I will share a room with: Check if Spouse ☐
☐ Please assign a roommate for me.

☐ I am Male ☐ I am Female

☐ I am Vegetarian ☐ Medical Diet – See Chef on Arrival

Check Payment Information

All checks payable to **DNPS at Asilomar.**

Mail this form with check to:

Asilomar Conference Grounds**P.O. Box 537****Pacific Grove, CA 93950****Fax: 831-642-4262**

GENERAL INFORMATION

- **Cancellations within 60 days prior to arrival date forfeit all fees.**
- **All cancellations are subject to a \$25 per person processing fee.**
- **There are a limited number of single person rooms. You are encouraged to find a second person to share the room. The lower cost is because the price is PER PERSON double occupancy.**
- All rates are for full time conference participation. There is no discount for shorter stays.
- Housing rates are per person and include lodging, meals, meeting space rental, and all applicable taxes. Meals begin with dinner on the first day and end with lunch on the last day. Check in 3 p.m. Check out 12 noon.
- Purchase orders and telephone reservations will not be accepted.
- To preserve the refuge atmosphere at Asilomar, our Guest rooms are free from the distraction of televisions and telephones. There is a business center located next to the front desk.
- All Guest rooms and meeting rooms are non-smoking.
- For additional information see our website **VisitAsilomar.com**



For more information and to register, visit the web at:

www.asminternational.org/shape

Registration Information

Registration Information

Registration includes admittance to four days of technical meetings, one copy of the proceedings (available after the event), social events (Sunday reception, Monday bonfire, Wednesday Banquet and Thursday beach barbeque), product exhibits, and daily refreshment breaks.

Advanced Registration:

There are three convenient ways to register:

1. Register online at www.asminternational.org/shape.
2. Fax your completed registration form including credit card information to ASM International, Customer Service Center at **1-440-338-4634**.
3. Mail your completed registration form with payment to:
ASM International, Customer Service Center, 9639 Kinsman Road,
Materials Park, Ohio, 44073-0002 USA.
 - Direct any questions to ASM International, Customer Service Center at 1-440-338-5151 or toll-free: 1-800-336-5152, ext.6 or e-mail customer.service@asminternational.org.
 - Register early to avoid delays when you arrive at the event! Advanced registration must be postmarked by **April 21, 2006**. **Payment must be included** with the registration form. Registration received without payment will not be processed.
 - Your conference badge will be prepared and ready for pick up at Conference Registration, Asilomar Conference Grounds.

On-Site Registration:

If your registration form and payment have not been mailed to ASM International by **April 21, 2006**, you will be required to fill out a registration form and pay, in U.S. dollars, on-site by cash, check, traveler's check (Payable to ASM International), or credit card (VISA, MasterCard, American Express, Diners Club, Discover).

Registration will be open during the following hours at Asilomar Conference Grounds, Pacific Grove, California.

Sunday, May 7	3:00 p.m. - 9:00 p.m.
Monday, May 8	7:00 a.m. - 4:00 p.m.
Tuesday, May 9	7:00 a.m. - 4:00 p.m.
Wednesday, May 10	8:00 a.m. - 12:00 p.m.
Thursday, May 11	8:00 a.m. - 11:00 a.m.



Cancellation Policy:

Registration fees will be refunded if a written request is received by **April 21, 2006**. Written requests received on or after **April 22, 2006** will be subject to a \$50.00 service fee. After May 1, 2006, no refunds will be granted. Send all requests in writing to ASM International, Customer Service Center, 9639 Kinsman Road, Materials Park, OH 44073-0002 USA; or fax 440-338-4634.

Please note that reservations for accommodations at the Asilomar Conference Grounds have different cancellation deadlines. Please see the Housing Form for cancellation information or contact Asilomar at **1-831-642-4222**.

Tax Deduction:

An income-tax deduction is allowed for expenses for education (including registration fees, travel, meals, and lodging) undertaken to maintain and improve professional skills (see Treas. Reg. 1.162-5) (U.S. registrants only).

Registration Bonus for Non-Members

If you are not a member of ASM International at the time of your registration, you will receive a **One-Year ASM and SMST Membership or a one-year Material Advantage (ASM/TMS/AIST/Acers) Joint Student Membership** as a bonus for attending **SMST 2006**. Please complete the registration form carefully, as this information will be entered as your new member data. Your Membership Welcome Packet and Membership Card will automatically be sent to you after the conference. **We look forward to your active participation as a new member!**



For more information and to register, visit the web at:

www.asminternational.org/shape



Registration Form

Advance Registration Deadline: April 21, 2006

The International Conference
on Shape Memory and
Superelastic Technologies
May 7-11, 2006
Asilomar Conference Grounds
Pacific Grove, California USA

Complete and mail this form to:

ASM International Customer Service Center • 9639 Kinsman Road • Materials Park, OH 44073-0002
USA Or fax your registration to the ASM Customer Service Center at Fax: 440-338-4634

Please print or type

Mr. ☐ Ms. ☐ Dr. ☐ Prof. ☐ ASM/SMSST ID# (required for discount) _____

Last Name _____ First Name _____ Middle Initial _____

Job Title _____

Company _____

Street Address or P.O. Box _____

Dept./M.S. _____

City _____ State/Province _____ Zip _____

Country _____

Phone _____ Fax _____

E-mail _____

Is the above address a ☐ business address or a ☐ home address?

☐ If you have a disability that requires special assistance, check here and we will contact you.



Person to contact in case of emergency _____ Phone _____

Dietary Restrictions: ☐ Vegetarian ☐ Kosher ☐ Diabetic

Please select up to 3 choices in each category that most relates to your current job:

Materials Interests

Processes

Materials Evaluation & Selection

- ☐ R01 Carbon/Alloy Steels ☐ S01 Heat Treating ☐ T01 Material Selection
- ☐ R02 Stainless Steels ☐ S02 Rolling ☐ T02 Failure Analysis
- ☐ R03 Tool Steels ☐ S03 Forging ☐ T03 Microelectronic Failure Analysis
- ☐ R04 Cast Irons ☐ S04 Casting ☐ T04 Metallurgy
- ☐ R05 Superalloys ☐ S05 Powder Metallurgy ☐ T05 Optical and/or Electron Microscopy (SEM, TEM, etc.)
- ☐ R06 Heat Resistant Metals ☐ S06 Extrusion/Drawing ☐ T06 Adv Characterization Tech (X-Ray, Diff., EDS, WDS, etc.)
- ☐ R07 Refractory Metals ☐ S07 Stamping/Shaping ☐ T07 Chromatography, etc.)
- ☐ R08 Aluminum ☐ S08 Machining/Grinding ☐ T08 Mechanical Testing
- ☐ R09 Titanium ☐ S09 Thermal Spray ☐ T09 (Including Hardness)
- ☐ R10 Other Nonferrous Metals ☐ S10 Surface Engineering/Modification ☐ T10 Corrosion Testing
- ☐ R11 Intermetallics ☐ S11 Coatings ☐ T11 Tribology
- ☐ R12 Metal Matrix Composites ☐ S12 Welding/Joining
- ☐ R13 Structural Plastics ☐ S13 Brazing
- ☐ R14 Polymer Matrix Composites ☐ S14 Modeling Processes
- ☐ R15 Structural Ceramics ☐ S15 Organizational Training
- ☐ R16 Refractories ☐ R17 Ceramic Matrix Composites
- ☐ R18 Electronic Materials ☐ R19 Environmental Issues
- ☐ R20 Biomaterials ☐ R21 Shape Memory Alloys

REGISTRATION OPTIONS

Registration Options - Early Bird (prior to March 24) - includes full technical program, one conference proceedings, product exhibition and reception, Sunday reception, Monday bonfire, Wednesday banquet, Thursday beach barbecue, and all beverage breaks

Full Conference ☐ \$895 (AAAA) ☐ \$995 (AAAB)¹

Student Full Conference² ☐ \$495 (CCCC) ☐ \$549 (CCCD)¹

Registration Options (after March 24) - includes same functions as early bird registration

Full Conference ☐ \$995 (ALAA) ☐ \$1,095 (ALAB)¹

Student Full Conference² ☐ \$495 (CLCC) ☐ \$549 (CLCD)¹

Workshop Registration (Sunday, May 7) with a conference registration

Full Workshop ☐ \$295 (MMMM) ☐ \$295 (MMMA)

Student Full Workshop² ☐ \$145 (MMCA) ☐ \$145 (MNCB)

Workshop Registration (Sunday, May 7) without a conference registration

Full Workshop ☐ \$495 (MMMC) ☐ \$495 (MMNC)

Student Full Workshop² ☐ \$145 (MMCC) ☐ \$145 (MNCC)

Additional Options

Wednesday Banquet Ticket _____ No. of Tickets at \$95 each (KKKA)

Additional Proceedings³ _____ No. of copies at \$120 each (05189Z) _____ No. of copies at \$149 each (05189ZN)

Additional Student Proceedings³ _____ No. of copies at \$75 each (05189S) _____ No. of copies at \$75 each (05189SN)

Companion/Guest Ticket - includes Sunday reception, Monday bonfire, Wednesday banquet, Thursday beach barbecue

Name of Companion/Guest _____ ☐ \$295 (LLLL) ☐ \$295 (LLLB)

¹ Non-member fee includes a complimentary one-year ASM and SMSST membership or Material Advantage (ASM/TMS/AST/ACE/S)

² To qualify for the student rate, you must attach a copy of your student ID. Registrations received without appropriate verifications will be charged the Full Conference fee

³ One copy of the proceedings is included with the Full Conference fee

☐ **Yes, I wish to receive Advanced Materials & Processes magazine** (Full conference registrant only).

☐ **No, I do not wish to receive Advanced Materials & Processes magazine.**

(signature and date required to process)

Please add shipping to all book/CD orders. For items shipped to the U.S. and Canada, add \$9 for the first item, plus \$2 for each additional item. For items shipped to destinations outside the U.S. and Canada, add \$11 per item.

Method of Payment (All payments must be in U.S. dollars)

Registrations will not be processed without full payment

☐ Check enclosed (payable to ASM International)

☐ Check# _____

☐ MasterCard ☐ VISA ☐ American Express ☐ Discover ☐ Diners Club

Credit Card Number _____

Expiration Date _____

Signature _____

ASM reserves the right to amend this program as necessary.

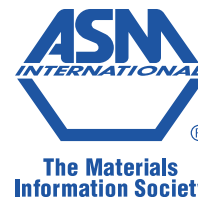
Grand Total: \$ _____

VISIT:

www.asminternational.org/shape

REGISTER ONLINE TODAY!

The International Conference on Shape Memory and Superelastic Technologies



May 7-11, 2006
Asilomar Conference Grounds
Pacific Grove, California USA

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 - R&D Trends
 - Innovative Applications
- Product Exhibition
- Gala Banquet at the Monterey Bay Aquarium

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CESM0603



For more information and to register, visit the web at:

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