NITINOL AND BEYOND

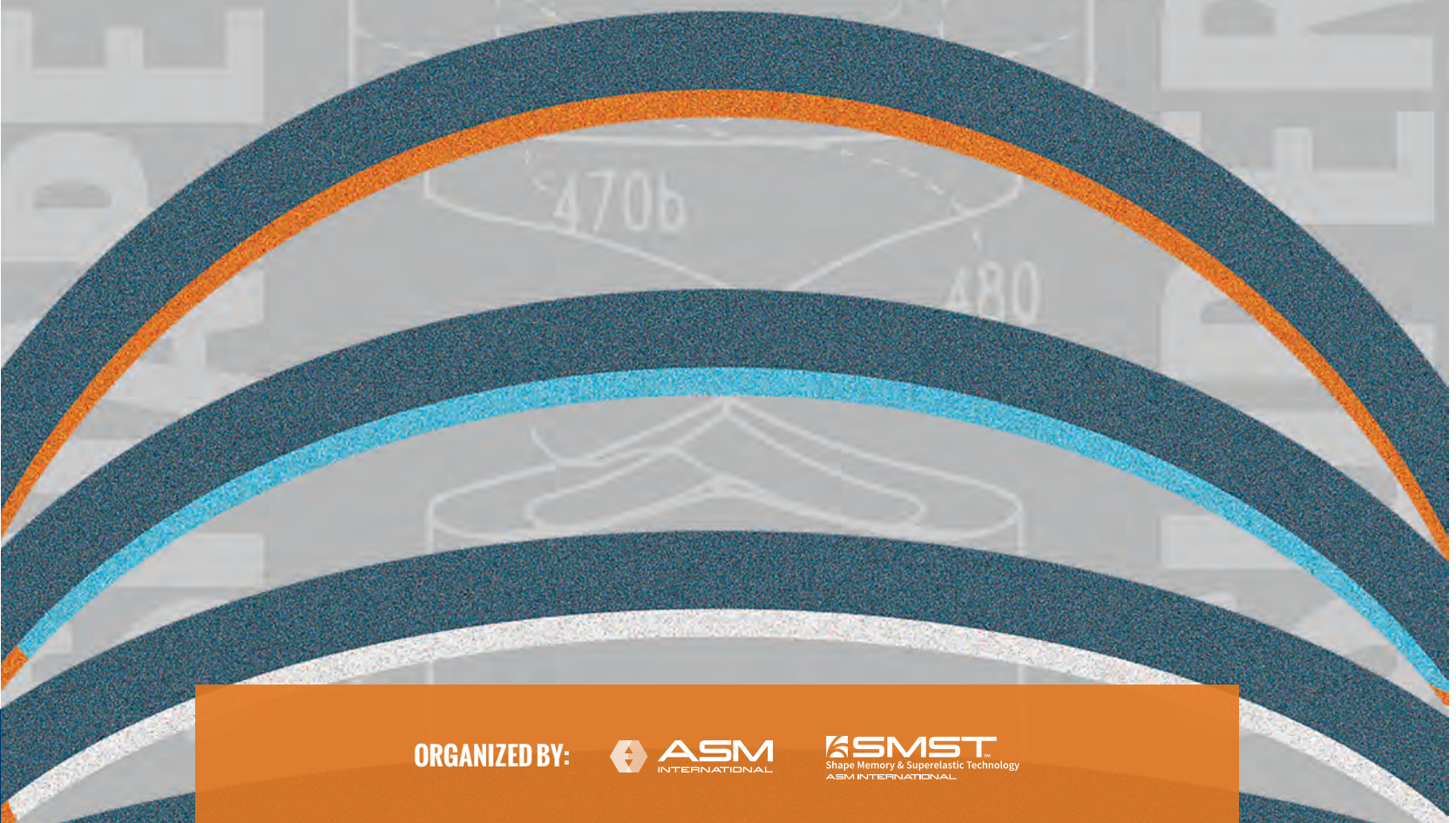
SMST 2017 • PARADISE POINT • 1404 VACATION ROAD • SAN DIEGO, CALIFORNIA, USA

SMST2017

MAY 15-19, 2017

SHAPE MEMORY & SUPERELASTIC TECHNOLOGIES
CONFERENCE & EXPOSITION

FINAL PROGRAM



ORGANIZED BY: ASM INTERNATIONAL | SMST Shape Memory & Superelastic Technology ASM INTERNATIONAL

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WELCOME TO SMST 2017: NITINOL & BEYOND!

This year ushers a new era for SMST – this is our first conference in the USA to be held outside of our founding grounds of Asilomar. We are excited to welcome you to Paradise Point in the beautiful San Diego Harbor. 2017 also marks two other firsts for SMST: 1. It is the first time that medical device specific talks are outnumbered in the technical program, and 2. We are proud to host the Consortium for the Advancement of Shape Memory Alloy Research and Technology (CASMART) student design competition for the first time. We are also excited for a second – the announcement of the Second SMST Fellowship winner. These markers speak to the growth and diversification of our community and SMST as an organization. It is only possible with your participation and support, for which we thank you.

We eagerly welcome our Plenary Speakers. To open the conference, Prof. Dick James will teach us about some of the origins of hysteresis in SMAs, and more specifically how we can use that knowledge to design better SMAs. He will be followed by one of his former Ph.D. students, Dr. Brian Berg, who is now a leader and historian of the Medical Device Community. Tuesday afternoon, Prof. Michele Manuel will speak about the role of precipitates in designing better SMAs. As the conference continues through the week, Mr. Jim Mabe will tell us about some of the latest developments in Boeing's SMA programs, while Dr. Chris Dellacorte of NASA will inform us of the utility of very nickel rich Nitinol for applications on the International Space Station and beyond. Our Plenary lineup is rounded out by talks on the mechanics of SMAs – Dr. Benjamin Reedlunn teaching us about the behaviors of SMAs under multiaxial loading, and the always enthusiastic Prof. Q.P. Sun will present is latest breakthroughs in microstructure engineering for enhanced SMA performances.

In addition to the technical program, this year's Exposition and Social Events will allow for all of those networking opportunities that keep you coming back to SMST time and time again. If this is your first SMST event, a special welcome!

Your SMST 2017 Chair,

Aaron Stebner

CONTENTS

GENERAL INFORMATION

CONFERENCE REGISTRATION

Day/Date	Hours	Location
Monday, May 15, 2017	3:00 p.m. – 7:00 p.m.	Bay View/Sunset Foyer
Tuesday, May 16, 2017	7:00 a.m. – 5:00 p.m.	Bay View/Sunset Foyer
Wednesday, May 17, 2017	7:30 a.m. – 1:00 p.m.	Bay View/Sunset Foyer
Thursday, May 18, 2017	7:30 a.m. – 5:00 p.m.	Bay View/Sunset Foyer
Friday, May 19, 2017	7:30 a.m. – 12:00 p.m.	Bay View/Sunset Foyer

EXHIBITION DATES AND TIMES

The Show Directory can be found on page 43.

Tuesday, May 16

Exhibits Open	12:00 p.m. – 7:00 p.m.
Lunch on the Exhibit Floor	12:00 p.m. – 1:00 p.m.
Refreshment Break	3:15 p.m. – 3:45 p.m.
Expo Networking Reception/Poster Session	5:30 p.m. – 7:00 p.m.

Wednesday, May 17

Exhibits Open	10:00 a.m. – 1:00 p.m.
Lunch on the Exhibit Floor	12:00 p.m. – 1:00 p.m.

SESSION CHAIRS

REMINDER: Pick up your session packet at Registration the day of your session from 7:30 a.m. – 8:00 a.m. Within your packet, you will receive instructions and program information relevant to the day for you to pass along to your speakers. Twenty minutes prior to the start of your session, please meet your speakers in the meeting room you are assigned to review necessary conference information and to assist them in uploading their PowerPoint presentations.

SPEAKERS

REMINDER: All speakers must meet in the room of your presentation twenty minutes prior to the start of the session. This will allow all speakers the opportunity to meet their session chair, go over any final conference details and audio visual concerns and upload your PowerPoint presentation.

CONFERENCE PROCEEDINGS

Conference Proceedings are available to all registered attendees. A link to the conference proceedings is included in the KNOW BEFORE YOU GO email sent out the week before the event. Please let us know if you did not receive the email and we will resend.

REFRESHMENT BREAKS AND LUNCHES

Morning and afternoon refreshment breaks will be provided each day. Please refer to the Schedule of Events for exact timing and locations. Lunch will be provided Tuesday - Thursday.

INTERNET

Complimentary wireless internet is available in the Paradise Point meeting rooms. Network: ASM. Password: smst2017

POLICY ON AUDIO AND VIDEO RECORDING

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

GENERAL INFORMATION

POLICY ON CELLULAR PHONE USAGE

In consideration of fellow event attendees and presenters, show management 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.

AMERICANS WITH DISABILITIES

In accordance with the Americans with Disabilities Act (ADA) of 1990, SMST is striving to accommodate all of our guests with special needs. If a disability requires that you have access to modified housing, transportation or other assistance, please inform the conference staff.

ASM ANTI-HARASSMENT POLICY

ASM International is dedicated to providing harassment-free events for everyone, regardless of age, race, religion, disability, gender, gender identity or sexual orientation. We do not tolerate harassment in any form from anyone attending an ASM event. Harassing behaviors include: offensive verbal comments related to age, race, religion, disability, gender, gender identity or sexual orientation; the use or display of sexual images, activities or commentary in public spaces; deliberate intimidation; stalking or following; harassing photography or recording; sustained disruption of events; or inappropriate physical contact. Participants asked to stop any harassing behavior are expected to comply immediately. Participants violating this policy may be sanctioned or expelled from the event or the membership at the discretion of ASM leadership.

SMST 2017 ORGANIZING COMMITTEE

SMST 2017 CONFERENCE CO-CHAIRS:

Dr. Samantha Daly
University of Michigan

Dr. Aaron Stebner
Colorado School of Mines

STEERING COMMITTEE:

Dr. Othmane Benafan
NASA Glenn Research Center

Mr. Frederick Tad Calkins
Boeing

Dr. Tom Duerig
Nitinol Devices & Components

Dr. Darel E. Hodgson, FASM
Nitinol Technology

Dr. Matthias Mertmann
Redsystem GmbH

Dr. Michael R. Mitchell
Mechanics & Materials Consulting, LLC

Dr. Alan R. Pelton
G. Rau Inc.

SCHEDULE AT A GLANCE

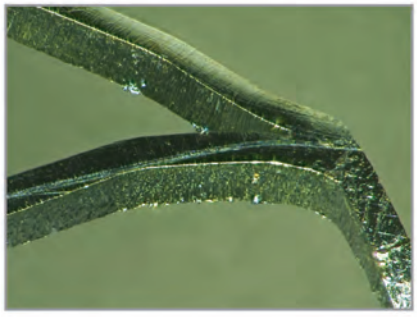
Date	Time	Event	Location
Monday, May 15, 2017			
	3:00 p.m. – 7:00 p.m.	Registration Open	Sunset Foyer
	9:00 a.m. – 5:00 p.m.	Nitinol Workshop	Dockside Room
	5:00 p.m. – 7:00 p.m.	Welcome Reception	Sunset Deck
Tuesday, May 16, 2017			
	7:00 a.m. – 5:00 p.m.	Registration Open	Sunset Foyer
	8:00 a.m. – 8:10 a.m.	Opening Remarks	Sunset Ballroom 4 & 5
	8:10 a.m. – 8:50 a.m.	Plenary Session: Richard James	Sunset Ballroom 4 & 5
	8:50 a.m. – 9:30 a.m.	Plenary Session: Brian Berg	Sunset Ballroom 4 & 5
	9:30 a.m. – 9:40 a.m.	Awards Presentation	Sunset Ballroom 4 & 5
	9:40 a.m. – 10:00 a.m.	Refreshment Break	Sunset Deck
	10:00 a.m. – 11:45 a.m.	Designing Next Generation Shape Memory Materials and Forms I	Sunset Ballroom 4 & 5
	10:00 a.m. – 12:00 p.m.	Mechanics of Shape Memory Materials: Modeling Meets Experiments I	Sunset Ballroom 1 – 3
	12:00 p.m. – 1:00 p.m.	Lunch	Sunset Pavilion
	12:00 p.m. – 7:00 p.m.	Exhibits Open	Sunset Pavilion
	1:00 p.m. – 1:45 p.m.	Plenary Session: Jim Mabe	Sunset Ballroom 4 & 5
	1:45 p.m. – 2:00 p.m.	Refreshment Break	Sunset Deck
	2:00 p.m. – 3:15 p.m.	Designing Next Generation Shape Memory Materials and Forms II	Sunset Ballroom 4 & 5
	2:00 p.m. – 3:15 p.m.	Production, Processing, and Standards I	Sunset Ballroom 1 – 3
	3:15 p.m. – 3:45 p.m.	Refreshment Break	Sunset Deck
	3:45 p.m. – 5:30 p.m.	Shape Memory Actuators and Superelastic Damping Structures I	Sunset Ballroom 4 & 5
	3:45 p.m. – 5:30 p.m.	Production, Processing, and Standards II	Sunset Ballroom 1 – 3
	5:30 p.m. – 7:00 p.m.	Poster Session	Sunset Pavilion
	5:30 p.m. – 7:00 p.m.	Expo Networking Reception/Poster Session	Sunset Pavilion
Wednesday, May 17, 2017			
	7:30 a.m. – 1:00 p.m.	Registration Open	Sunset Foyer
	8:00 a.m. – 9:30 a.m.	Shape Memory Actuators and Superelastic Damping Structures II	Sunset Ballroom 4 & 5
	8:00 a.m. – 9:30 a.m.	Microstructure Characterizations of Materials I	Sunset Ballroom 1 – 3
	9:30 a.m. – 10:00 a.m.	Refreshment Break	Sunset Deck
	10:00 a.m. – 12:00 p.m.	SMA Failure Analysis & Modeling	Sunset Ballroom 4 & 5
	10:00 a.m. – 12:00 p.m.	Shape Memory and Superelastic Medical Devices	Sunset Ballroom 1 – 3
	10:00 a.m. – 1:00 p.m.	Exhibits Open	Sunset Pavilion
	12:00 p.m. – 1:00 p.m.	Lunch	Sunset Pavilion
	1:00 p.m. – 6:30 p.m.	Free Time	
	6:30 p.m. – 9:30 p.m.	Social Networking Event: Beach Party	Paradise Cove

SCHEDULE AT A GLANCE

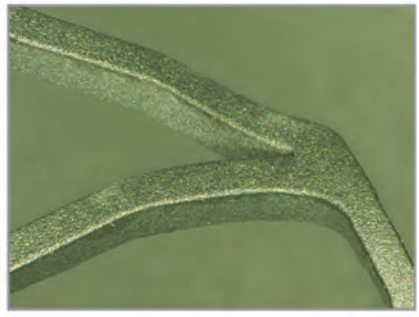
Date	Time	Event	Location
Thursday, May 18, 2017			
	7:30 a.m. – 5:00 p.m.	Registration Open	Sunset Foyer
	8:00 a.m. – 8:45 a.m.	Plenary Session: Chris Dellacorte	Sunset Ballroom 4 & 5
	8:45 a.m. – 9:30 a.m.	Plenary Session: Benjamin Reedlunn	Sunset 4 & 5
	9:30 a.m. – 10:00 a.m.	Refreshment Break	Meeting Space Foyer
	10:00 a.m. – 11:45 a.m.	Shape Memory Actuators and Superelastic Damping Structures III	Sunset Ballroom 4 & 5
	10:00 a.m. – 11:45 a.m.	Mechanics of Shape Memory Materials: Modeling Meets Experiments II	Sunset Ballroom 1 – 3
	11:45 a.m. – 1:00 p.m.	Lunch	Sunset Terrace
	1:00 p.m. – 1:45 p.m.	Plenary Session: Michele Manuel	Sunset Ballroom 4 & 5
	1:45 p.m. – 2:00 p.m.	Refreshment Break	Meeting Space Foyer
	2:00 p.m. – 3:15 p.m.	Production, Processing, and Standards III	Sunset Ballroom 4 & 5
	2:00 p.m. – 3:15 p.m.	Mechanics of Shape Memory Materials: Modeling Meets Experiments III	Sunset Ballroom 1 – 3
	3:15 p.m. – 3:45 p.m.	Refreshment Break	Meeting Space Foyer
	3:45 p.m. – 5:00 p.m.	Designing Next Generation Shape Memory Materials and Forms III	Sunset Ballroom 4 & 5
	3:45 p.m. – 5:00 p.m.	Mechanics of Shape Memory Materials: Modeling Meets Experiments IV	Sunset Ballroom 1 – 3
	5:00 p.m. – 7:00 p.m.	Design Competition	Sunset Pavilion
Friday, May 19, 2017			
	7:30 a.m. – 12:00 p.m.	Registration Open	Sunset Foyer
	8:00 a.m. – 8:45 a.m.	Plenary Session: Qingping Sun	Sunset Ballroom 4 & 5
	8:45 a.m. – 9:30 a.m.	Surface Engineering & Corrosion I	Sunset Ballroom 4 & 5
	8:45 a.m. – 9:30 a.m.	Microstructure Characterizations of Materials II	Sunset Ballroom 1 – 3
	9:30 a.m. – 10:00 a.m.	Refreshment Break	Meeting Space Foyer
	10:00 a.m. – 12:00 p.m.	Surface Engineering & Corrosion II	Sunset Ballroom 4 & 5
	10:00 a.m. – 12:00 p.m.	Material & Device Testing	Sunset Ballroom 1 – 3
Programs are tentative: papers, authors and order of presentations are subject to change.			

EVENT LAYOUT MAP

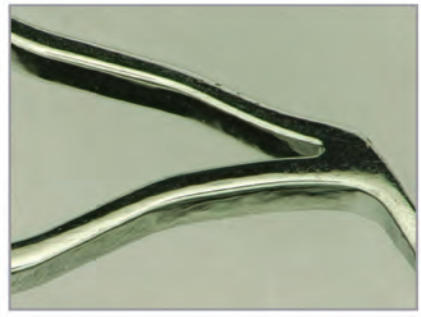
For a Better Finish



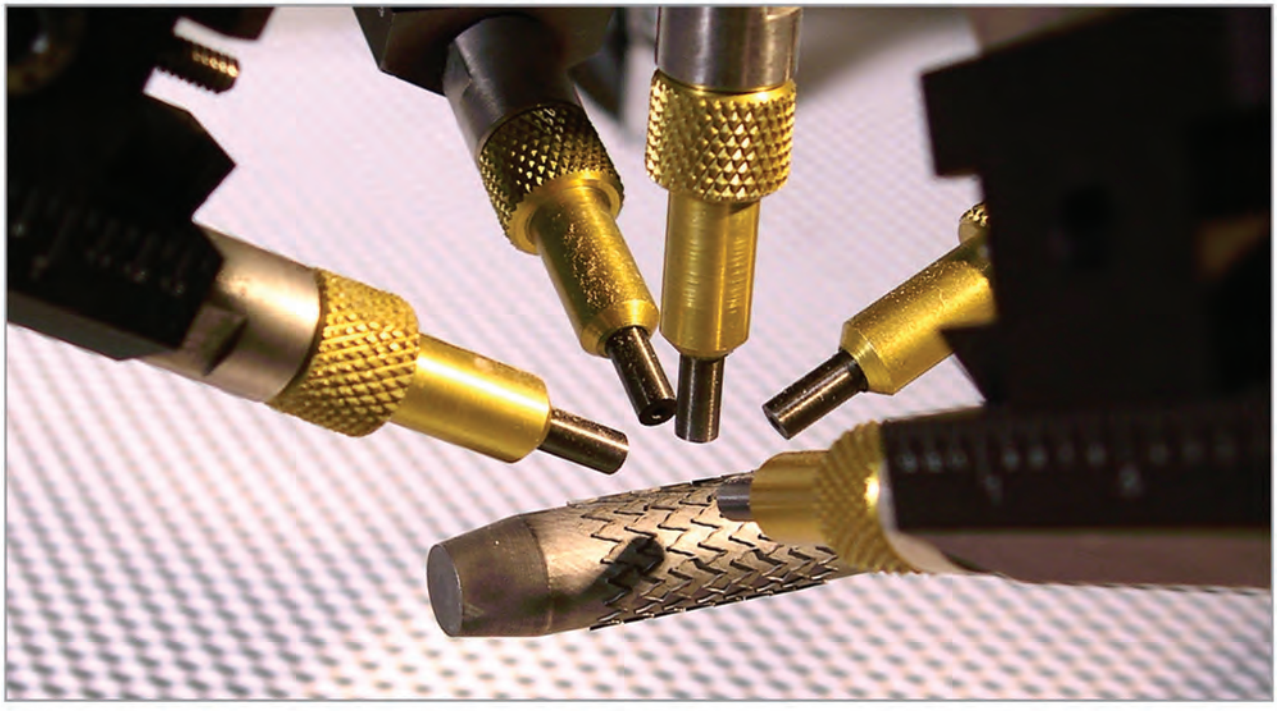
Step 1
Laser cut to desired shape



Step 2
MicroBlast to create a uniform finish



Step 3
Electropolish



Remove:
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MicroBlasting is an essential step to create the best base for a consistent electropolish finish.

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EDUCATION COURSE

NITINOL WORKSHOP

Monday, May 5, 2017
Paradise Point Resort
Dockside Room
9:00 a.m. – 5:00 p.m.

An optional all-day education course on Nitinol Technology will be held for those who wish to gain a more fundamental understanding of shape memory and superelasticity. Course topics will include:

How Nitinol works: Basic thermal and mechanical properties

How to make Nitinol: Processing to optimize in vivo performance of medical devices

How to design with Nitinol: Strategies on design of medical devices

How Nitinol performs: Insight into fatigue and corrosion properties

This course is an excellent opportunity for attendees to strengthen their understanding of shape memory and superelastic materials in advance of the technical sessions.

WORKSHOP ORGANIZER
Dr. Alan R. Pelton
Chief Technical Officer
G. RAU, Inc.

INSTRUCTORS / TOPICS
Dr. Neil Morgan, *Advanti* - Introduction to Shape Memory and Superelasticity
Dr. Othmane Benafan, *NASA Glenn Research Center* - Introduction to Shape Memory Actuators
Brian Berg, Ph.D., *Boston Scientific* - Introduction to Medical Devices
Dr. Scott Robertson, *Fathom Engineering* - Introduction to Fatigue
Ms. Katie Miyashiro, *Medtronic TMVR Venture* - Introduction to Corrosion and Biocompatibility

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2017 SMST FELLOWSHIP RECIPIENT

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Edwards

Presentation of Award: Tuesday, May 16, Plenary Session

The intent of the SMST Fellowship is to provide a current use gift to a deserving graduate student(s) or post-doctoral researcher with the purpose of initiating interest in a unique path of research for shape memory materials. The 2017 SMST Fellowship is sponsored by Edwards.

Benjamin Young
B.S. in Materials Science and Nanoengineering, Rice University, 2016
Ph.D. in Materials Science and Engineering, Texas A&M University, Ongoing

Actuation Fatigue and Fracture of High Temperature Shape Memory Alloys

Affordable nano-precipitation hardened high temperature shape memory alloys (HTSMAs) have recently been discovered which exhibit stable cyclic actuation response at up to 400°C under stresses up to 600 MPa with a fully recoverable transformation range of 3–5%, and power densities an order of magnitude higher than conventional actuator systems. These materials are promising for use as small, high power output solid-state actuators, but their actuation-induced failure and fracture properties are completely unknown and must first be understood for the effective design and performance of actuators. Microstructure and its interaction with phase transformation has a strong contribution to crack growth/formation and statistical variability. However, we do not have a robust way currently to discuss the fracture mechanics of phase-transforming materials The main goal of the proposed research is to study the failure mechanisms and fracture mechanics of NiTiHf HTSMAs, with and without nano-precipitates under various thermo-mechanical loading paths. This research will provide the knowledge needed to optimize HTSMA microstructure to achieve maximum fracture resistance and increased actuation fatigue life, as well as provide a framework to study the fracture mechanics of other phase-transforming materials. The outcomes of this work will contribute to the development of small solid-state actuators from this and other phase-transforming materials, enabling new and improved capabilities for aircraft such as aeroelastic tailoring and the ability to incorporate passive and active noise, thermal and flow control features directly into aircraft structures.

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SHAPE MEMORY AND SUPERELASTICITY BEST PAPER AWARDS

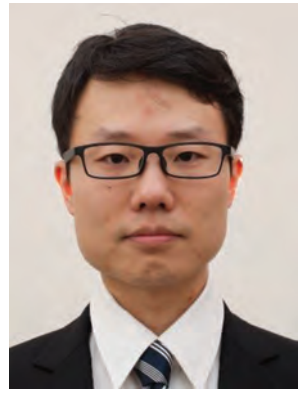
Shape Memory and Superelasticity is pleased to announce the winners of the 2015 Best Paper Award and the 2016 Best Paper Award. The award, in addition to the recognition, includes a plaque and $1,000 worth of ASM International products and services.

2015 Best Paper Award

The 2015 Best Paper Award winner is "Composition Dependences of Entropy Change and Transformation Temperatures in Ni-rich Ti–Ni System" by Dr. Kodai Niitsu, Department of Materials Science, Graduate School of Engineering, Tohoku University, Sendai, Japan and the Center for Emergent Matter Science, Riken, Wako, Japan; and Mr. Yuta Kimura, Dr. Xiao Xu, and Dr. Ryosuke Kainuma, Department of Materials Science, Graduate School of Engineering, Tohoku University, Sendai, Japan.

Dr. Kodai Niitsu

Mr. Yuta Kimura



Dr. Xiao Xu

Dr. Ryosuke Kainuma

Due to the closeness of scores for the 2015 Best Paper, three papers will receive a 2015 Best Paper Honorable Mention. The three papers selected for an honorable mention include "Crystal Structure, Transformation Strain, and Superelastic Property of Ti–Nb–Zr and Ti–Nb–Ta Alloys" by Professor Hee Young Kim, Mr. Jie Fu, Dr. Hirobumi Tobe, Professor Jae Il Kim, and Dr. Shuichi Miyazaki, "Fatigue Crack Growth Fundamentals in Shape Memory Alloys" by Mr. Yan Wu, Mr. Avinesh Ojha, Dr. Luca Patriarca, and Dr. Huseyin Sehitoglu, and "In Situ Neutron Diffraction Studies of Increasing Tension Strains of Superelastic Nitinol" by Dr. Alan R. Pelton, Dr. Bjørn Clausen, and Professor Aaron P. Stebner.

2016 Best Paper Award

Mr. Avinesh Ojha

Dr. Huseyin Sehitoglu

The 2016 Best Paper Award winner is "Critical Stresses for Twinning, Slip, and Transformation in Ti-Based Shape Memory Alloys" by Mr. Avinesh Ojha and Dr. Huseyin Sehitoglu, Department of Mechanical Science and Engineering University of Illinois at Urbana-Champaign, Urbana, Illinois, USA.

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NETWORKING EVENTS

REFRESHMENT BREAKS

Tuesday, May 16

Morning Refreshment Break	9:40 a.m. – 10:00 a.m.
Mid-Afternoon Refreshment Break	1:45 p.m. – 2:00 p.m.
Late Afternoon Refreshment Break	3:15 p.m. – 3:45 p.m.

Wednesday, May 17

Morning Refreshment Break	9:30 a.m. – 10:00 a.m.

Thursday, May 18

Morning Refreshment Break	9:30 a.m. – 10:00 a.m.
Mid-Afternoon Refreshment Break	1:45 p.m. – 2:00 p.m.
Late Afternoon Refreshment Break	3:15 p.m. – 3:45 p.m.

Friday, May 19

Morning Refreshment Break	9:30 a.m. – 10:00 a.m.

LUNCH ON THE EXHIBIT FLOOR

Tuesday, May 16	12:00 p.m. – 1:00 p.m.
Wednesday, May 17	12:00 p.m. – 1:00 p.m.

WELCOME RECEPTION

Monday, May 15, 2017
5:00 p.m. - 7:00 p.m.
Sunset Deck
Join us at your leisure for a chance to network and meet with your colleagues and the SMST exhibitors as people arrive and get settled at the Paradise Point Resort. Casual attire please. **Sponsored by Euroflex.**

EXHIBITOR & POSTER RECEPTION

EUROFLEX®
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Tuesday, May 16, 2017
5:30 p.m. – 7:00 p.m.
Sunset Pavilion
Come for an evening of fun, food and friends; products and services from the enterprise community will be on display for SMST attendees.

AFTERNOON FREE TIME

Wednesday, May 17, 2017
1:00 p.m. – 6:00 p.m.
The afternoon has been left open for you to explore San Diego and surrounding areas to see a variety of local attractions. A complimentary bus is available from 1:30 p.m. – 5:30 p.m. on rotation to take you into Old Town. It will pick-up and drop-off along Mission Bay Lane under the Main Conference Center Porte Cochere. The drop-off point in Old Town is the intersection of Twiggs and San Diego Ave.

EVENING SOCIAL EVENT

Wednesday, May 17, 2017
This year's Social Event will be a Beach Party at Paradise Point. Enjoy an evening with your colleagues as you relax on the beach with dinner, drinks and entertainment. **Sponsored by Vascotube.**

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TUESDAY, MAY 16

Prof. Richard D. James
University of Minnesota

Design of Supercompatible Shape Memory Alloys

8:10 a.m. – 8:50 a.m.

Richard James is Distinguished McKnight University Professor in the Department of Aerospace Engineering and Mechanics at the University of Minnesota. He has a Sc.B. in Biomedical Engineering from Brown University and a Ph.D. in Mechanical Engineering from the Johns Hopkins University. He has authored or co-authored 140 articles, has given 40 plenary and named lectures, and was awarded the Humboldt Senior Research Award (2006/7), the Warner T. Koiter Medal from ASME (2008), the William Prager Medal from the Society of Engineering Science (2008), the Brown Engineering Alumni Medal (2009), and the Theodore von Karman Prize from SIAM (2014, joint with Weinan E). James' current research concerns (i) the study of "Objective Structures", a mathematical way of looking at the structure of matter, (ii) the study of the origins of the reversibility of solid-solid phase transformations, and (iii) the direct conversion of heat to electricity using phase transformations in multiferroic materials.

Mr. Brian Berg
Boston Scientific

Breakthroughs and Misfortunes in the Maturing of NiTi Medical Device Development

8:50 a.m. – 9:30 a.m.

Brian Berg is a Senior Research Fellow with Boston Scientific where he helps develop coronary, cardiac, and peripheral vasculature devices and mechanical tests. His experience with Nitinol spans from his Ph.D. on elastic and thermo-elastic mechanics of Nitinol wire to manufacturing of Nitinol dental arch wires to fatigue and functional testing of Nitinol coronary stents, peripheral stents, and cardiac devices. He is a long standing active ASTM member, serving on both F04 and E08 committees, and has served on the ASM SMST board.

Michele Manuel
University of Florida

Design for Precipitation Strengthening in NiTi-based Shape Memory Alloys

1:00 p.m. – 1:45 p.m.

Michele V. Manuel is the Rolf E. Hummel Professor of Electronic Materials and the Department Chair in the Department of Materials Science and Engineering at the University of Florida. She received her Ph.D in Materials Science and Engineering at Northwestern University in 2007 and her B.S. in Materials Science and Engineering at the University of Florida. She is the recipient of the 2013 Presidential Early Career Awards for Scientists and Engineers (PECASE), NSF CAREER, NASA Early Career Faculty, ASM Bradley Stoughton Award for Young Teachers, AVS Recognition for Excellence in Leadership, TMS Early Career Faculty, TMS Young Leaders Professional Development, and TMS/JIM International Scholar Awards. Her research lies in the basic understanding of the relationship between processing, structure, properties and performance. She uses a systems-based materials design approach that couples experimental research with theory and mechanistic modeling for the accelerated development of materials. Her current research is focused on the use of systems-level design methods to advance the development of new materials through microstructure optimization. Of specific interest are lightweight alloys, self-healing metals, computational thermodynamics and kinetics, shape memory alloys, and materials in extreme environments—specifically under high magnetic fields or irradiation.

KEYNOTE PRESENTATIONS

THURSDAY, MAY 18

Dr. Christopher Dellacorte
NASA, Glenn Research Center

NiTi Alloys for Structural and Tribological Applications: The Other Side of Superelastics

8:00 a.m. – 8:45 a.m.

Dr. DellaCorte began his NASA career in 1985 as a graduate student in the Surface Science Branch. In 1987, shortly after earning a masters of science degree in mechanical and aerospace engineering from Case Western Reserve University (CWRU) he was hired as a permanent employee to work on tribology (friction and wear) problems for extreme environments. Early career highlights include developing an understanding of the friction and wear behavior of emerging engineered ceramics that were then candidates for advanced heat engines and aerospace vehicle airframes and structures. Much of this research became the basis for his Ph.D. dissertation (CWRU, 1989).

Dr. DellaCorte's primary research focus for the last several years has been the development and application of bearings and gears made from emerging nickel-titanium based superelastic materials. These alloys are immune from atmospheric corrosion (rust) and can withstand shock loads that often limit aero and space bearing applications. So far, four patents have been awarded for this work and more are pending.

Dr. DellaCorte's technical accomplishments and contributions, over his career, have earned him prestigious recognitions including; the NESC Engineering Excellence Award, NASA Space Flight Awareness Award, NASA Qasar Award for the ISS SARJ Failure Analysis, NASA Silver Snoopy Award, the NASA Exceptional Service Medal, two R&D 100 Awards, and the Federal Laboratory Consortium Award for Commercialization.

Dr. DellaCorte's work is recognized nationally and internationally and he is an active professional society leader attaining Fellow rank in the American Society of mechanical Engineers (ASME) and the Society of Tribologists and Lubrication Engineers (STLE). He was the founding editor of STLE's monthly publication Tribology and Lubrication Technology. He is now the Editor-In-Chief of the peer-reviewed journal Tribology Transactions. He previously served two terms on STLE's board of directors.

Dr. Benjamin Reedlunn
Sandia National Laboratories

Axial-Torsion Behavior of Superelastic NiTi Tubes

8:45 a.m. – 9:30 a.m.

The majority of Benjamin Reedlunn's career has involved superelastic NiTi. After finishing an undergraduate degree in mechanical engineering, he joined a team of engineers to help design a NiTi stent at Medtronic Vascular. He spent two and a half years improving manufacturing processes, designing the radiopaque markers, and studying the stent's fatigue behavior. Benjamin then attended the University of Michigan for a masters degree in materials science and a doctorate in mechanical engineering. Under the guidance of Prof. John Shaw and Prof. Samantha Daly, he investigated the thermo-mechanical behavior of NiTi cables, as well as the the bending and combined axial-torsion of NiTi tubes. Their paper titled, "Superelastic Shape Memory Alloy Cables: Part I – Isothermal Tension Experiments," won the International Journal of Solids and Structures 2013 best paper of the year. In 2012, Benjamin began work at Sandia National Laboratories in Albuquerque, New Mexico. He has since broadened his research interests to include ductile failure of metals, the crystal plasticity finite element method, additive manufacturing of metals, and the geomechanics of rock salt.

Jim Mabe
Boeing Research and Technology

Challenges towards Successful Integration and Test of SMA Aerospace Applications

1:00 p.m. – 1:45 p.m.

Mr. Mabe is currently a Technical Fellow (TF) for Boeing Research and Technology (BR&T) in St. Louis, Missouri. He is a Boeing Subject Matter Expert (SME) in the field of Shape Memory Alloys (SMA) and active materials for actuator systems. He has over 30 years of research experience at Boeing including an extensive background in laboratory and flight testing, aerospace systems, aeronautics, instrumentation and controls, and SMA materials.

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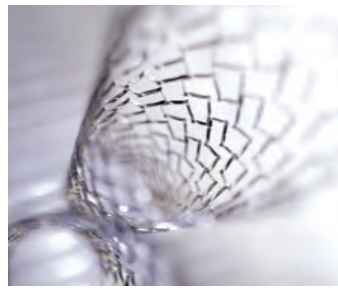

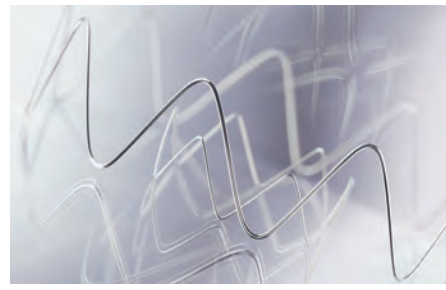

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KEYNOTE PRESENTATIONS

For the last 15 years he has worked on the development of aerospace actuators using active materials such as Shape Memory Alloys. In 2005 and 2006 he was Principal Investigator (PI) for the development of SMA actuators for the Variable Geometry Chevron (VGC) flight tests program. In 2011 and 2012 he led the development and flight test of torsional SMA actuators for the Adaptive Trailing Edge program that incorporated SMA actuators to position flaps on the trailing edges of 737-900 wings.

Currently Mr. Mabe is leading a team of researchers focusing on SMA technologies including the development of design tools and allowables for SMA materials, investigating new materials such as High Temperature Shape Memory Alloys, developing standardized test methods to facilitate the certification of SMA applications, and the design, build and test of aerospace applications. He currently chairs an Aviation Vehicle Systems Institute (AVSI) committee that is developing standardized and industry accepted test methods for shape memory alloy material and components to be used for material allowables and certification. The committee has drafted two new SMA test methods that are currently under review by ASTM. Mr. Mabe is a regular speaker and organizer at aerospace and active material conferences, and frequently appears in conference and journal proceedings and publications. He holds several patents related to SMA actuator technology, with several patents pending. He graduated with a BSEE in Electrical Engineering from Seattle Pacific University in 1995.

FRIDAY, MAY 19

Prof. Qingping Sun
Tsinghua University

Control property and behavior of nano-structured NiTi SMAs by grain size engineering

8:00 a.m. – 8:45 a.m.

Dr. Qingping SUN is the Professor of the Department of Mechanical and Aerospace Engineering and the Director of the Institute of Integrated Microsystems at the Hong Kong University of Science and Technology (HKUST). Prof. SUN received his PhD in solid mechanics from Tsinghua University in 1989 and joined the faculty of HKUST in 1995. Prof. Sun's primary research area is the mechanics of phase transitions in materials, with special interests in phase transition process in shape memory alloys, ceramics and nano- and biological materials/systems. His research work covers problems in the inter-disciplinary area between mechanics, solid state physics, biology and materials science. He is an internationally renowned expert in mechanics of shape memory materials and is distinguished for his contributions in the areas of nanoscale phase transition and mechanics of multi-scaled processes with multi-field coupling. He has published over 130 research papers in prestigious journals in the fields of mechanics, solid state physics and material science. He has received national and international recognition for his research and teaching, including the "State Natural Science Award of China" (1996); the "Best Engineering Teaching Excellence Award" (2002) of HKUST; the "Citation Classic Award" from ISI (2001). He gave over 30 invited Keynote Lectures and 7 Plenary Lectures in international conferences. He was the visiting professor in several universities/national labs in France (Ecole Polytechnique, Ecole Normal Superieur, etc.), served as the editorial boards for six International journals and as the Chairman and members of Scientific Committees for many international conferences.

SMST IRELAND 18

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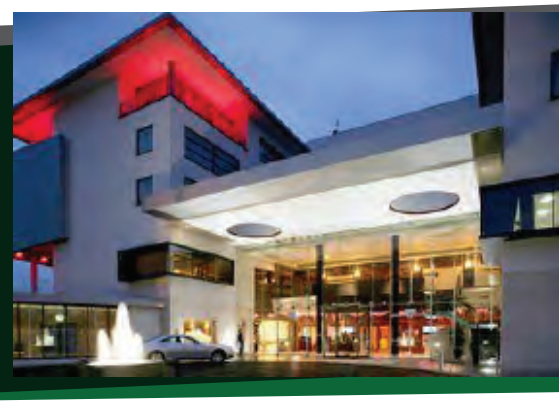

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For further information, or to engage, please contact:

Kathy Murray,
Kathy.Murray@asminternational.org
+1.440.338.5151 (x5231)

Ms. Murray will put you in contact with local organizer, Neil Morgan or other as required

DRAFT AGENDA:

0730/0800
Breakfast and registration

0800/1000
Education 1: History, advance, state-of-the-art of SMA & NiTi.

1000/1030
Tea social

1030/1200
Education 2: Applications, when NOT to use SMA, design for fatigue

1200/1300 Lunch social

1300/1600
Industrial and academic short talks on new applications, challenges, and solutions in design with SMA & NiTi (12-15 talks depending on quality/commitment)

1600/1700
Open discussion

1700/...
Pub event social, cross-functional engagement for all interested!

SMST℠
Shape Memory & Superelastic Technology
ASM INTERNATIONAL

TECHNICAL PROGRAM

Tuesday, May 16, 2017

7:30 a.m. – 5:00 p.m.	Registration Open	Bay View / Sunset Foyer
8:00 a.m. – 8:10 a.m.	Opening Remarks	Sunset Ballroom 4 & 5
8:10 a.m. – 8:50 a.m.	Plenary Session: Richard James	Sunset Ballroom 4 & 5
8:50 a.m. – 9:40 a.m.	Plenary Session: Brian Berg	Sunset Ballrooms 4 & 5
9:30 a.m. – 9:40 a.m.	Awards Presentation	Sunset Ballroom 4 & 5
9:40 a.m. – 10:00 a.m.	Morning Refreshment Break	Sunset Ballroom Deck
10:00 a.m. – 11:45 a.m.	Designing Next Generation Shape Memory Materials and Forms I	Sunset Ballrooms 4 & 5
10:00 a.m. – 12:00 p.m.	Mechanics of Shape Memory Materials: Modeling Meets Experiments I	Sunset Ballrooms 1 – 3
12:00 p.m. – 1:00 p.m.	Lunch	Sunset Pavillion
12:00 p.m. – 5:00 p.m.	Exhibits Open	Sunset Pavilion
1:00 p.m. – 1:45 p.m.	Plenary Session: Michele Manuel	Sunset Ballroom 4 & 5
1:45 p.m. – 2:00 p.m.	Mid-Afternoon Refreshment Break	Sunset Ballroom Deck
2:00 p.m. – 3:15 p.m.	Designing Next Generation Shape Memory Materials and Forms II	Sunset Ballrooms 4 & 5
2:00 p.m. – 3:15 p.m.	Production, Processing, and Standards I	Sunset Ballrooms 1 – 3
3:15 p.m. – 3:45 p.m.	Late Afternoon Refreshment Break	Sunset Pavillion
3:45 p.m. – 5:30 p.m.	Shape Memory Actuators and Superelastic Damping Structures I	Sunset Ballrooms 4 & 5
3:45 p.m. – 5:15 p.m.	Production, Processing, and Standards II	Sunset Ballrooms 1 – 3
5:30 p.m. – 7:00 p.m.	Poster Session	Sunset Pavilion
5:30 p.m. – 7:00 p.m.	Expo Networking Reception	Sunset Pavilion

Plenary Session: Richard James & Brian Berg
8:10 a.m.-9:30 a.m.
Meeting Room: Sunset Ballrooms 4 & 5

8:10 a.m.
Design of Supercompatible Shape Memory Alloys: Dr. Richard D. James, Aerospace Engineering and Mechanics, University of Minnesota, Minneapolis, MN

9:40 a.m.–10:00 a.m. Morning Refreshment Break

8:50 a.m.
Breakthroughs and Misfortunes in the Maturing of NiTi Medical Device Development: Dr. Brian T. Berg, Boston Scientific Corporation, Maple Grove, MN

Designing Next Generation Shape Memory Materials and Forms: Beyond Nitinol I
10:00 a.m.-11:45 a.m.
Meeting Room: Sunset Ballroom 4 & 5

Session Chair:
Dr. Othmane Benafan
NASA Glenn Research Center
Cleveland, OH USA

10:00 a.m.
Precipitation Strengthenable NiTiPd High Temperature Shape Memory Alloys: Mr. Glen S Bigelow[1], Dr. Anita Garg[2], Dr. Othmane Benafan[3], Dr. Ronald D Noebe[3], Mr. Darrell J Gaydosh[3] and Dr. Santo A Padula[3], [1]High Temperature and Smart Materials Branch, NASA Glenn Research Center, Cleveland, OH, [2]University of Toledo/NASA Glenn Research Center, Cleveland, OH, [3]NASA Glenn Research Center, Cleveland, OH

10:15 a.m.
In-situ Characterization Of Functional Properties In Polycrystalline Co-Ni-Ga High-Temperature Shape Memory Alloys: Mr. Christian Lauhoff[1], Mr. Alexander Paulsen[2], Dr. Jan Frenzel[2], Mr. Philipp Krooß[1] and Prof. Thomas Niendorf[1], [1]Institute of Materials Engineering, University of Kassel, Kassel, Germany, [2]Institute for Materials Science, Ruhr University Bochum, Bochum, Germany

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10:30 a.m.
Using NiTi20Hf As A High-Temperature Shape Memory Alloy—Review Of Physical Properties: Mr. Yuri Khoptiar, **Mr. Royi Padan**, Mr. Yeshurun Cohen and Dr. Joseph Flomenblit, Advanced Materials Dept., Rafael Advanced Defense Systems Ltd., Haifa, Israel

10:45 a.m.
Structural and Functional Stability of Ti-30Ta High Temperature Shape Memory Alloys: Mr. Alexander Reul, Crystallography, Ludwig-Maximilians-University Munich, Munich, Germany

11:15 a.m.
In-situ SR-XRD Examination of Phase and Oxide Growth during a High Temperature Cycle with Short Isothermal Holds of a NiTi-20 at.% Zr HTSMA: Mr. Mathew Carl[1], Mr. Brian Van Doren[2] and Dr. Marcus L. Young[1], [1]Materials Science and Engineering, University of North Texas, Denton, TX, [2]ATI Specialty Alloys and Components, Albany, OR

11:30 a.m.
On the Processability and Scale-Up of NiTi-20Hf High Temperature Shape Memory Alloys: Dr. Othmane Benafan[1], Mr. Glen S Bigelow[1], Dr. Anita Garg[2], Dr. Ronald D Noebe[1], Dr. Santo A Padula[1], Mr. Darrell J Gaydosh[1] and Mr. Timothy Halsmer[3], [1]NASA Glenn Research Center, Cleveland, OH, [2]University of Toledo/NASA Glenn Research Center, Cleveland, OH, [3]Jacobs Technology, Cleveland, OH

12:00 p.m.–1:00 p.m. Lunch

Mechanics of Shape Memory Materials: Modeling Meets Experiments I
10:00 a.m.-12:00 p.m.
Meeting Room: Sunset Ballroom 1-3

Session Chair:
Dr. Harshad Paranjape
Colorado School of Mines
Golden, CO USA

10:00 a.m.
Experimental and Numerical Investigations on Homogeneous vs. Localized Deformation Modes During Shear-Compression Loading of Pseudoelastic NiTi: Prof. Martin F.-X. Wagner, Ms. Mina Pouya and Mr. Cagatay Elibol, Technische Universitaet Chemnitz, Institute of Materials Science and Engineering, Chair of Materials Science, Chemnitz, Germany

10:30 a.m.
Texture Induced Anisotropic Negative Thermal Expansion Behavior of As-Smelted Ti-rich Ti-Ni Alloys with Different Ni Contents: Mr. Zhong-Xun Zhao, Mr. Xing Zhu, Dr. Xiao Ma, Dr. Shan-Shan Cao, Dr. Chang-Bo Ke and Prof. Xin-Ping Zhang, School of Materials Science and Engineering, South China University of Technology, Guangzhou, China

10:45 a.m.
Anisotropic Tensile Behavior Of NiTi Tubes And Its Dependence On Temperature: Mrs. Estephanie Nobre Dantas Grassi[1,2], **Prof. Denis Favier**[1,2] and Dr. Gregory Chagnon[1,2], [1]TIMC-IMAG, University Grenoble Alpes, La Tronche, France, [2]TIMC-IMAG, CNRS, La Tronche, France

11:00 a.m.
Relaxation Behavior of Martensitic NiTi SMA Wires in Tension: Mr. Cagatay Elibol and Prof. Martin F.-X. Wagner, Technische Universitaet Chemnitz, Institute of Materials Science and Engineering, Chair of Materials Science, Chemnitz, Germany

11:15 a.m.
The Influence of Residual Martensite on the Two-Way Shape Memory Effect in NiTi Alloys: Mr. Christopher M. Laursen and Dr. Carl P. Frick, Mechanical Engineering, University of Wyoming, Laramie, WY

11:45 a.m.
Size and Surface Effects in Shape Memory Alloys: Mr. Partha Paul, Mechanical Engineering, Northwestern University, Evanston, IL

12:00 p.m.–1:00 p.m. Lunch

SMST2019

Shape Memory and Superelastic Technology
Conference and Exposition

SAVE THE DATE:
May 13-17, 2019

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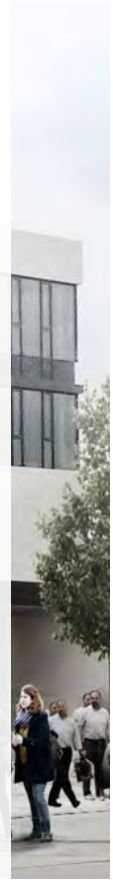

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Plenary Session: Michele Manuel
1:00 p.m.-1:45 p.m.
Meeting Room: Sunset Ballroom 4 & 5

1:00 p.m.
Design for Precipitation Strengthening in NiTi-based Shape Memory Alloys: Prof. Michele V. Manuel, Materials Science and Engineering, University of Florida, Gainesville, FL

1:45 p.m. Mid-Afternoon Refreshment Break

Designing Next Generation Shape Memory Materials and Forms: Beyond Nitinol II
2:00 p.m.-3:15 p.m.
Meeting Room: Sunset Ballroom 4 & 5

Session Chair:
Dr. Othmane Benafan
NASA Glenn Research Center
Cleveland, OH USA

2:00 p.m.
A Group of Ni-Free Super-Elastic Beta Ti Alloys: Dr. S. Cai[1] and **Dr. Jeremy E. Schaffer**[2], [1]Fort Wayne Metals Research Products Corporation, Fort Wayne, IN, [2]Research and Development, Fort Wayne Metals Research Products Corporation, Fort Wayne, IN

2:30 p.m.
Single Crystal Zirconia Shape Memory Ceramics: Dr. Alan Lai[1] and Prof. Christopher A. Schuh[2], [1]Massachusetts Institute of Technology, Cambridge, MA, [2]Materials Science and Engineering, Massachusetts Institute of Technology, Cambridge, MA

2:45 p.m.
The Development of Nickel-Titanium-Hafnium Superelastic Alloys for Biomedical Implants, Dr. Behnam Amin-ahmadi[1], Mr. Joseph Pauza[1], Dr. Tom Duerig[2], Dr. Ronald D Noebe[3], Dr. Aaron Stebner[1], [1]Colorado School of Mines, Golden, CO, [2]Confluent Medical Technologies, Fremont, CA, [3]NASA Glenn Research Center, Cleveland, OH

3:00 p.m.
Shape Memory Properties Of Mg-Sc Alloy: Mrs. Yukiko Ogawa, Dr. Daisuke Ando, Dr. Yuji Sutou and Dr. Junichi Koike, Tohoku University, Sendai, Japan

Production, Processing, and Standards I
2:00 p.m.-3:15 p.m.
Meeting Room: Sunset Ballroom 1 - 3

Session Chair:
Dr. Petr Sittner
Institute of Physics, CAS
Prague, Czech Republic

2:00 p.m.
The Comparison of Differential Scanning Calorimetry, Uniaxial Prestrain and Free Recovery and Uniaxial Constant Force Thermal Cycling Tests for High Ni and High Ti NiTi Alloys: Mr. Frank Sczerzenie and Matt Long, SAES Smart Materials, New Hartford, NY

2:15 p.m.
Applying UCFTC and UPFR (ASTM Suggested Test Methods) On Different NiTi Shapes—Qualitative Comparison: Mr. Royi Padan, Mr. Yeshurun Cohen, Mr. Nir Feintuch and Mr. Yuri Khoptiar, Advanced Materials Dept., Rafael Advanced Defense Systems Ltd., Haifa, Israel

2:30 p.m.
Microstructural and Mechanical Characterization of a Fine-Grained and Textured Ni51Ti49 Alloy Prepared by Rapid Solidification and Processed by Solution Treatment: Mr. Caiyou Zeng, Ms. Yuanyuan Li, Mr. Zhongxun Zhao, Dr. Shanshan Cao, Dr. Xiao Ma and **Prof. Xin-Ping Zhang**, School of Materials Science and Engineering, South China University of Technology, Guangzhou, China

2:45 p.m.
The Effect Of The Heat Treatment Temperature On The Thermodynamic Properties Of The 55.89wt%Ni-Ti Shape Memory Alloy: Dr. Boutheina BEN FRAJ and Prof. Zoubeir TOURKI, Mechanical laboratory of Sousse, National Engineering School of Sousse, Sousse, Tunisia

3:00 p.m.
A Study of the Influence of Thermo-Mechanical Processing on VIM-VAR Melted NiTi Shape Memory Alloys: Dr. R. M. Manjeri[1], Rich Lafond[1], Mr. Frank Sczerzenie[1], Dr. Weimin Yin[1], Mr. Grant Brewer[2], Mr. Andrea Cadelli[3] and Dr. Alberto Coda[3], [1]SAES Smart Materials, New Hartford, NY, [2]SAES Memry, Bethel, CT, [3]SAES Getters S.p.A, Lainate, Italy

3:15 p.m.–3:45 p.m. Late Afternoon Refreshment Break

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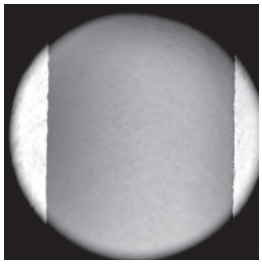
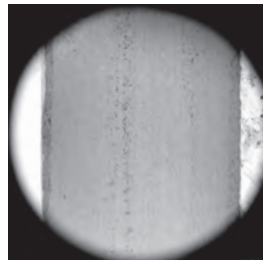
Surface of Johnson Matthey Nitinol Tube



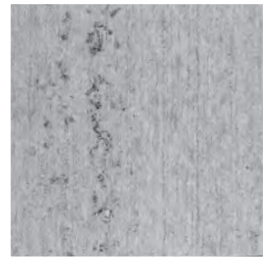
JM enhanced ID surface 140x

JM enhanced ID surface 500x

Surface of Typical Nitinol Tube



Typical Nitinol tube surface 140x



Typical Nitinol tube surface 500x

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Production, Processing, and Standards II
3:45 p.m.-5:30 p.m.
Meeting Room: Sunset Ballroom 1-3

Session Chair:
Dr. R. M. Manjeri
SAES Smart Materials
New Hartford, NY USA

3:45 p.m.
Low Temperature Shape Setting of NiTi: Dr. Petr Sittner[1], Mr. Pavel Sedmak[2,3], Mr. Lukas Kaderavek[2,4], Dr. Jan Pilch[4], Dr. R. Delville[5] and Dr. Ludek Heller[1], [1]Institute of Physics, CAS, Prague, Czech Republic, [2]Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University, Prague, Czech Republic, [3]ESRF, Grenoble, France, [4]Institute of Physics CAS, Prague, Czech Republic, [5]SCK.CEN, Mol, Belgium

4:15 p.m.
Laser Assisted Shape Setting of Superelastic NiTi Wires: Dr. Carlo Alberto Biffi and Dr. Ausonio Tuissi, Institute of Condensed Matter Chemistry and Technologies for Energy, CNR ICMATE, National Research Council of Italy, Lecco, Italy

4:30 p.m.
A New Process For Joining Nitinol to Stainless Steels For Medical Devices: Dr. Abhishek Telang[1], Dr. Roger Dickenson[2] and Mr. Arne Rimmereide[1], [1]R&D, Integer Holdings Corporation, Chaska, MN, [2]Accellent, Salem, VA

4:45 p.m.
A Method To Locally Tune Pseudoelasticity Of NiTi Stent: Ms. Gitanjali Shanbhag[1], Mr. Andrew Michael[1], **Mr. Siu Kei Tang[2],** Prof. Y. Norman Zhou[3], Dr. Michael L Kuntz[2] and Dr. Mohammad I Khan[2], [1]Mechanical and Mechatronics Engineering, University of Waterloo, Waterloo, ON, Canada, [2]Smarter Alloys, Waterloo, ON, Canada, [3]Centre for Advanced Materials Joining, University of Waterloo, Waterloo, ON, Canada

5:00 p.m.
The Effect of Low Temperature Aging on Ni-rich Ti-Ni: Dr. Ali Shamimi[1], Dr. Tom Duerig[2], Dr. Behnam Aminahmadi[3] and Dr. Aaron Stebner[4], [1]R&D, NDC, Fremont, CA, [2]Confluent Medical Technologies, Fremont, CA, [3]Colorado School of Mines, Golden, CO, [4]Mechanical Engineering, Colorado School of Mines, Golden, CO

5:15 p.m.
The Effect Of Copper Addition In The Transformation Temperatures In Rapid Solidified Ti–Ni-Cu Alloys: Mr. George Carlos S Anselmo, University Federal de Campina Grande, Campina Grande-PB, Brazil

Shape Memory Actuators, Caloric, and Superelastic Damping Devices I
3:45 p.m.-5:30 p.m.
Meeting Room: Sunset Ballroom 4 & 5

Session Chair:
Dr. Frederick Tad Calkins
The Boeing Company
Seattle, WA USA

3:45 p.m.
Tailorable Damping Capacity in NiTi Shape Memory Alloy: Dr. Kadri C. Atli, Mechanical Engineering, Anadolu University, Eskisehir, Turkey

4:00 p.m.
Large Diameter Hot Rolled NiTiCo Bars for Civil Engineering Structures: Dr. Weimin Yin, Mr. Frank Sczerzenie, Matt Long, Clarence Belden, Dr. R. M. Manjeri and Rich Lafond, SAES Smart Materials, New Hartford, NY

4:15 p.m.
Caloric Effects in Shape Memory Alloys—Optimizing Alloy Compositions for Solid State Refrigeration: Dr. André Wieczorek, Dr. Jan Frenzel and Prof. Gunther Eggeler, Institute of Materials, Ruhr-University Bochum, Bochum, Germany

4:30 p.m.
Shape Memory Alloys and Elastocaloric Cooling: Prof. Jun Cui[1,2], Prof. Ichiro Takeuchi[3], Dr. Duane Johnson[1] and Dr. Vitalij Pecharsky[1], [1]Materials Science and Engineering, Ames Laboratory, Ames, IA, [2]Iowa State University, Ames, IA, [3]Materials Science and Engineering, University of Maryland, College Park, MD

4:45 p.m.
Ultralow-Fatigue of Elastocaloric NiTiCu-Based Thin Films: Prof. Eckhard Quandt[1], Mr. Christoph Chluba[1], Mr. Lars Bumke[1], Dr. Rodrigo Lima de Miranda[2], Mr. Julian Strobel[1] and Prof. Lorenz Kienle[1], [1]Materials Science, University of Kiel, Kiel, Germany, [2]Acquandas GmbH, Kiel, Germany

5:00 p.m.
Numerical Simulations of Temperature-Driven NiTi SMA Actuators: Dr. Petr Sedlak[1], Dr. Miroslav Frost[1], Mr. Vit Shanel[2], Dr. Ludek Heller[3], Mr. Lukas Kaderavek[3] and Dr. Petr Sittner[3], [1]Institute of Thermomechanics, CAS, Prague, Czech Republic, [2]Faculty of Mechanical Engineering, CTU in Prague, Prague, Czech Republic, [3]Institute of Physics, CAS, Prague, Czech Republic

5:15 p.m.
Actuators SMA Alloy For Based Temperature Control In Fuzzy Logic And Assisted By Thermography: Mrs. Francisca Cibele Silva, Materials engineering, Federal University of Campina Grande, Campina Grande, Brazil

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TECHNICAL PROGRAM

Poster Session
5:30 p.m.-7:00 p.m.
Meeting Room: Sunset Pavilion

Shape Memory Alloy-Based Rings for Ultra High Vacuum Applications in Particle Accelerators: Mr. Fabrizio Niccoli[1], C. Garion[1], Dr. Carmine Maletta[2], Dr. Emanuele Sgambitterra[2], Prof. Franco Furgiuele[2] and P. Chiggiato[1], [1]TE-VSC, European Center for Nuclear Research (CERN), Geneva, Switzerland, [2]Mechanical, Energy and Management Engineering, University of Calabria, Arcavacata Rende (CS), Italy

Effect of Minor Alloying Additions and Its Variation on Properties Affecting Shape Memory Behaviour of Cu-12Al-4Ni Alloy: Mr. Rupa Dasgupta, Ashish Kumar Jain, Ayub Ansari, Shahadat Hussain and Abhishek Pandey, CSIR-AMPRI, Madhya Pradesh, India

Effect of Heat Treatment on Redial Force of NiTi Tube Stent: Mr. Koosha Abedi, Mr. Jan Douglas and Mr. Allan Hemmingsen, Shape memory alloy, Cook Medical, Copenhagen, Denmark

Characterization of Fretting Damage in NiTi Superelastic Wires: Mr. Sergio Raul Soria[1], **Dr. Hugo Soul**[2] and Prof. Alejandro Yawny[3], [1]Fisica de Metales, CONICET, Centro Atomico Bariloche-CNEA, S.C. de Bariloche, Argentina, [2]Fisica de Metales, Instituto Balseiro and Centro Atomico Bariloche, San Carlos de Bariloche, Argentina, [3]Fisica de Metales, Centro Atomico Bariloche, Bariloche, Argentina

Influence of Thermal Cycling on the Phase Transformation Temperatures and Latent Heat of a NiTi Shape Memory Alloy: Mr. Tadeu Casto da Silva, Mr. Arthur Pinheiro Barcelos and Prof. Edson Paulo da Silva, Mechanical Engineering, University of Brasília, Brasília, Brazil

Influence of Heat Treatment on Mechanical Properties of Nickel-Titanium Endodontic Instruments—A Numerical Study: Ms. S. C. S. Martins, **Prof. L. A. Santos** and Prof. V. T. L. Buono, Department of Metallurgical and Materials Engineering, UFMG, Belo Horizonte, Brazil

Miniaturized Shape Memory (SMA) Bimorph Actuators with Polymer Layers: Mr. Cory R Knick, Mr. Gabe L Smith and Christopher J. Morris, US Army Research Laboratory, Adelphi, MD

Microstructural and Deformation Characteristics of a High Strength 60NiTi Alloy: Dr. Anita Garg[1], Dr. Othmane Benafan[2], Dr. Ronald D Noebe[2], Dr. H. D. Skorpenske[3], Dr. Ke An[3] and Dr. Norbert Schell[4], [1]NASA Glenn Research center/ University of Toledo, Cleveland, OH, [2]NASA Glenn Research Center, Cleveland, OH, [3]Neutron Scattering Science Division, Oak Ridge National Laboratory, Oak Ridge, TN, [4]Max Planck-Str. 1,21502, Helmholtz-Zentrum, Geesthacht, Germany

Temperature Dependent Fracture Properties of Pseudoelastic SMAs: measurements and modeling: Dr. Carmine Maletta, Dr. Emanuele Sgambitterra, Mr. Fabrizio Niccoli and Prof. Franco Furgiuele, Mechanical, Energy and Management Engineering, University of Calabria, Arcavacata Rende (CS), Italy

The Fatigue Behavior of Z-Shape Nitinol Specimen: Mr. Michael Ehrlinspiel[1], Mr. X. Huang[1], Mr. Andrea Cadelli[2] and Dr. Federico Gallino[3], [1]Memry Corporation, Bethel, CT, [2]SAES Getters S.p.A, Lainate, Italy, [3]SAES Getters S.p.A., Lainate, Italy

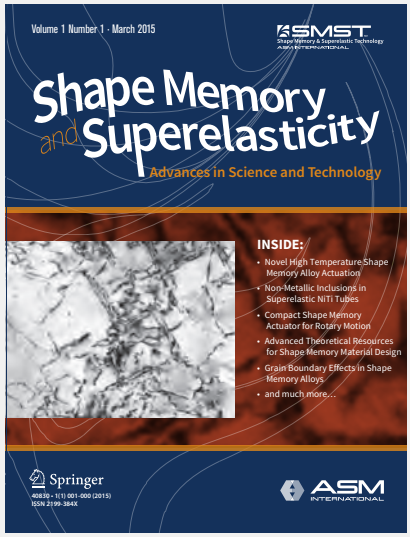
Correlation Between Residual Tensile Strain And Intrados Cracking: Dr. Michael Kimiecik, Dr. Paul Briant and Dr. Brad James, Exponent, Inc., Menlo Park, CA

Microstructural Characterization Of Ni4Ti3 Precipitates In Nickel Titanium Tubes And Modeling Of Precipitate-Matrix Interactions: Mr. Shivram Sridhar and Prof. Anthony Rollett, Materials Science and Engineering, Carnegie Mellon University, Pittsburgh, PA

Comparison of an Automatic Contacting Extensometer to a Clip-On Extensometer, and a Video Extensometer as a Strain Measurement Technique for Testing Nitinol Wire to ASTM F2516-14: Ms. Elayne Gordonov, Instron, Norwood, MA

Towards Inferring Superelasticity Parameters from Instrumented Indentation Data: Mr. Francisco Fernando Roberto-Pereira, Mr. J Dean and Prof. T. W. Clyne, Department of Materials Science, University of Cambridge, Cambridge, United Kingdom

TECHNICAL JOURNAL



Shape Memory and Superelasticity

Advances in Science and Technology

Editor-in-Chief: Huseyin Sehitoglu, University of Illinois

Shape Memory and Superelasticity: Advances in Science and Technology publishes original peer-reviewed papers that focus on shape memory materials research, with contributions from materials science, experimental and theoretical mechanics, and physics with cognizance of the chemistry, underlying phases, and crystallography.

A forum for researchers, scientists, and engineers of varied disciplines to access information about shape memory materials, the journal includes the following topics:

- All classes of shape memory materials including metals, non-metals (such as shape memory ceramics), polymers, and composites.
- Stress-strain response in thermo-mechanical loadings (experimental observations and modeling).
- Life prediction methodologies (different approaches including fracture mechanics, role of grain boundaries, the role of slip and twinning on shape memory behavior, and crack nucleation modeling).
- Thermodynamics of the transformation, the fundamentals of superelasticity and related areas such as twinning, detwinning, residual martensites.
- Solutions to shape memory problems in industry (including biomedical, electronic, MEMS, and structural applications).
- Critical experiments that shed insight into shape memory behavior including digital image correlation, diffraction methodologies (including those using high energy sources), in-situ microscopy, and mechanical testing methods.
- Novel experimental techniques for shape memory response (ranging from specimens of micron size, wires, laboratory specimens, rings, bent beams, and complex shapes to components).
- Single Crystals and polycrystals of shape memory metals highlighting the role of texture and orientation effects on superelasticity and recoverable strain levels, and the role of different processing methods on the SMA response.
- Shape memory response under coupled mechanical-magnetic fields, magnetic shape memory, and thermo-caloric effects.

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Wednesday, May 17, 2017

7:30 a.m. – 1:00 p.m.	Registration Open	Bay View / Sunset Foyer
8:00 a.m. – 9:30 a.m.	Shape Memory Actuators and Superelastic Damping Structures II	Sunset Ballrooms 4 & 5
8:00 a.m. – 9:30 a.m.	Microstructure Characterizations of Materials I	Sunset Ballrooms 1 – 3
9:30 a.m. – 10:00 a.m.	Morning Refreshment Break	Sunset Ballroom Deck
10:00 a.m. – 12:00 p.m.	SMA Failure Analysis & Modeling	Sunset Ballrooms 4 & 5
10:00 a.m. – 12:00 p.m.	Shape Memory and Superelastic Medical Devices	Sunset Ballrooms 1 – 3
10:00 a.m. – 1:00 p.m.	Exhibits Open	Sunset Pavilion
12:00 p.m. – 1:00 p.m.	Lunch	Sunset Pavilion
1:00 p.m. – 6:30 p.m.	Free Time	
6:30 p.m. – 9:30 p.m.	Social Networking Event: Beach Party	Paradise Cove

Shape Memory Actuators, Caloric, and Superelastic Damping Devices II
8:00 a.m.-9:30 a.m.
Meeting Room: Sunset Ballroom 4 & 5

Session Chair:
Dr. Frederick Tad Calkins
The Boeing Company
Seattle, WA USA

8:00 a.m.
Lifecycle Testing of Nitinol Rotary Actuators: Dr. Frederick Tad Calkins and Mr. Douglas Nicholson, The Boeing Company, Seattle, WA

8:15 a.m.
Experimental Determination of Crack Growth Rate during Thermal Cycling on NiTi Shape Memory Alloys: Mr. Ceylan Hayrettin[1], Mr. Sameer Jape[2], Dr. Theocharis Baxevanis[3], Prof. Ibrahim Karaman[4], Mr. Serdar Ozguc[1] and Dr. Dimitris C. lagoudas[2], [1]Material Science and Engineering, Texas A&M University, College Station, TX, [2]Aerospace Engineering, Texas A & M University, College Station, TX, [3]Aerospace Engineering, Texas A&M University, College Station, TX, [4]Materials Science and Engineering, Texas A&M University, College Station, TX

8:30 a.m.
Intriguing Challenges in the Development of High-Temperature Shape Memory Alloys: Dr. Alberto Coda[1], Mr. Andrea Cadelli[1], Mr. Luca Fumagalli[1], Dr. R. M. Manjeri[2], Dr. Weimin Hin[2] and Mr. Frank Sczerzenie[2], [1]SAES Getters S.p.A, Lainate, Italy, [2]SAES Smart Materials, New Hartford, NY

8:45 a.m.
High Performance Shape Memory Effect Mini Device Realized by Femtosecond Laser Cutting: Dr. Ausonio Tuissi[1], Dr. Carlo Alberto Biffi[1], Dr. Giulia Scalet[2], Dr. Elisa Boatti[2,3] and Prof. Ferdinando Auricchio[2], [1]Institute of Condensed Matter Chemistry and Technologies for Energy, National Research Council of Italy - CNR ICMATE, Lecco, Italy, [2]Department of Civil Engineering and Architecture, University of Pavia, Pavia, Italy, [3]Harvard John A. Paulson School of Engineering and Applied Sciences, Harvard University, Cambridge, MA

9:00 a.m.
Nitinol Actuating Fibers—on Materials, Processing and Miscellaneous: Prof. Qingfu CHEN, Mr. Chenbing HUANG, Mr. Stepanus WIDJAJA, Ms. Min XU and Mr. Songbai WU, Lumenous Peiertech, Jiangyin, Jiangsu, China

9:15 a.m.
Characterization Of Thermo-Mechanically Processed High Temperature Shape Memory Wires: Mr. Nathan A. Ley[1], Dr. Othmane Benafan[2] and Dr. Marcus L. Young[1], [1]Materials Science and Engineering, University of North Texas, Denton, TX, [2]NASA Glenn Research Center, Cleveland, OH

9:30 a.m.–10:00 a.m. Morning Refreshment Break

Microstructure Characterizations of Shape Memory Materials I
8:00 a.m.-9:30 a.m.
Meeting Room: Sunset Ballroom 1 - 3

Session Chair:
Ms. Ashley N. Bucsek
Colorado School of Mines
Golden, CO USA

8:00 a.m.
Three-Dimensional Measurements of Microstructure Evolution in Martensitic NiTi Using High Energy Diffraction Microscopy: Ms. Ashley N. Bucsek[1], Dr. Harshad Paranjape[1], Dr. Darren Dale[2], Dr. Peter Ko[2], Dr. Margaret Koker[2] and Dr. Aaron Stebner[1], [1]Mechanical Engineering, Colorado School of Mines, Golden, CO, [2]Cornell High Energy Synchrotron Source, Ithaca, NY

8:30 a.m.
In-situ High Energy Synchrotron Radiation X-ray Diffraction Measurements during Aging of NiTiHf High Temperature Shape Memory Alloy: Mr. Mathew Carl[1], Mr. Brian Van Doren[2] and Dr. Marcus L. Young[1], [1]Materials Science and Engineering, University of North Texas, Denton, TX, [2]ATI Specialty Alloys and Components, Albany, OR

8:45 a.m.
Abnormal Two-way Shape Memory Effect Induced by Low-temperature Aging in a Rapidly Solidified $Ni_{51}Ti_{49}$ Alloy: Mrs. Yuanyuan Li[1], Dr. Shanshan Cao[2], Dr. Changbo Ke[1], Dr. Xiao Ma[1], Prof. Xin-Ping Zhang[1] and **Mr. Zeng Caiyou**[1], [1]South China University of Technology, Guangzhou, China, [2]School of Materials Science and Engineering, South China University of Technology, Guangzhou, China

9:00 a.m.
Effects Of Grain Size On Fatigue And Wear Behaviors Of NiTi Shape Memory Alloy: Dr. Hao YIN, Civil Engineering, Wuhan University, Wuhan, China

9:30 a.m.–10:30 a.m. Morning Refreshment Break

Shape Memory and Superelastic Medical Devices
10:00 a.m.-12:00 p.m.
Meeting Room: Sunset Ballroom 1 - 3

Session Chair:
Dr. Jeremy E. Schaffer
Fort Wayne Metals Research Products Corporation
Fort Wayne, IN USA

10:00 a.m.
Development Of A Process For Programming Local Pseudoelastic Properties In An Orthodontic Archwire: Dr. Michael L Kuntz, Dr. Mohammad I Khan, Mr. Justin Valenti and Mr. Siu Kei Tang, Smarter Alloys, Waterloo, ON, Canada

10:15 a.m.
Self-Expandable NiTi Thin Film Devices With Multiple Electrodes For Bioelectric Sensing: Dr. Christoph Bechtold[1], Dr. Rodrigo Lima de Miranda[1], Mr. Christoph Chluba[1,2] and Prof. Eckhard Quandt[2], [1]Acquandas GmbH, Kiel, Germany, [2]Inorganic Functional Materials, Institute for Material Science, Christian-Albrechts-Universitaet zu Kiel, Kiel, Germany

10:30 a.m.
Cell Adhesion on NiTi Thin Film Sputter-Deposited Meshes: Mr. Klaas Loger[1], Mr. Alexander Engel[2], Dr. Jessica Haupt[2], Dr. Qian Li[1], Dr. Rodrigo Lima de Miranda[3], Prof. Eckhard Quandt[1], Prof. Georg Lutter[2] and **Prof. Christine Selhuber-Unkel**[1], [1]Materials Science, University of Kiel, Kiel, Germany, [2]University Hospital of Schleswig-Holstein, Department of Cardiovascular Surgery, Christian-Albrechts-Universitaet zu Kiel, Kiel, Germany, [3]Acquandas GmbH, Kiel, Germany

10:45 a.m.
Phase Transformation in NiTi Finished Medical Devices with High Precision Vision Technology: Mr. Stepanus Widjaja[1], Dr. Dimitri Aslanidis[1] and Mr. Todd Dickson[2], [1]Lumenous Peiertech, Jiangyin, Jiangsu, China, [2]Lumenous Device Technologies, Inc., Sunnyvale, CA

11:00 a.m.
Af Temperature And Mechanical Functionality Of Nitinol Implantable Medical Devices: Dr. Ming H. Wu[1], Dr. Yixin Xu[1], Dr. Fei Zhou[1], Dr. Hengchu Cao[1] and Mr. Todd Dickson[2], [1]Edwards Lifesciences, Irvine, CA, [2]Lumenous Device Technologies, Inc., Sunnyvale, CA

11:15 a.m.
Martensite/R-Phase Superelasticity and Its Implications to Nitinol Durability: Dr. Tom Duerig, Dr. Ali Shamimi and Mr. Craig Bonsignore, Confluent Medical Technologies, Fremont, CA

11:30 a.m.
Miniaturized Niti Self-Expandable Thin Film Devices With Increased Radiopacity: Dr. Rodrigo Lima de Miranda[1], Dr. Christoph Bechtold[1], Mr. Christoph Chluba[1,2], Dr. Christiane Zamponi[1,2] and Prof. Eckhard Quandt[2], [1]Acquandas GmbH, Kiel, Germany, [2]Inorganic Functional Materials, Institute for Material Science, Christian-Albrechts-Universitaet zu Kiel, Kiel, Germany

11:45 a.m.
Effects of Tube Processing on the Fatigue Life of Nitinol: Mr. Paul Adler[1], Mr. Rudolf Frei[2], Dr. Michael Kimiecik[3], Dr. Paul Briant[3], Dr. Brad James[3] and Chuan Liu[4], [1]Invariant-Plane Solutions, LLC, Wheeling, IL, [2]Vascotube GmbH, Birkenfeld, Germany, [3]Exponent, Inc., Menlo Park, CA, [4]Northwestern University, Evanston, IL

SMA Failure Analysis and Modeling
10:00 a.m.-12:00 p.m.
Meeting Room:

Session Chair:
Dr. M.R. Mitchell
Mechanics & Materials Consulting, LLC
Flagstaff, AZ USA

10:00 a.m.
Fatigue Behavior of Generation II and Generation III Nitinol: Dr. Alan R. Pelton[1], Mr. Sean M. Pelton[1], Mr. Tim Jörn[1], Dr. Annika Sorg[1], Dr. Jochen Ulmer[1], Mr. Dave Niedermaier[1] and Dr. M.R. Mitchell[2], [1]G.RAU Inc., Santa Clara, CA, [2]Mechanics & Materials Consulting, LLC, Flagstaff, AZ

10:30 a.m.
Influence of Inclusion Size and Void Size on the Rotary Bending Fatigue of Next Generation Nitinol Materials: Dr. Stefan Knoll[1], Dr. Jochen Ulmer[2], Hans Nusskern[1] and Gerhard Sedlmayr[1], [1]G. Rau GmbH & Co. KG, Pforzheim, Germany, [2]EUROFLEX GmbH, Pforzheim, Germany

10:45 a.m.
Evaluation Of Different Fatigue Criteria For NiTi Cardiovascular Devices: Mr. Dario Allegretti[1], Prof. Lorenza Petrini[2], Ms. Francesca Berti[1], Prof. Francesco Migliavacca[1] and Prof. Giancarlo Pennati[1], [1]LaBS - Laboratory of Biological Structure Mechanics - Department of Chemistry, Materials and Chemical Engineering "Giulio Natta", Politecnico di Milano, Milan, Italy, [2]Department of Civil and Environmental Engineering, Politecnico di Milano, Milan, Italy

11:00 a.m.
Development And Experimental Validation Of a Constitutive Model For NiTi Medical Devices Subjected To Fatigue And Plasticity: Prof. Lorenza Petrini[1], Mr. Alessandro Bertini[2], Dr. Elena Villa[3], Dr. Adelaide Nespoli[3] and Prof. Francesco Migliavacca[2], [1]Department of Civil and Environmental Engineering, Politecnico di Milano, Milan, Italy, [2]LaBS - Laboratory of Biological Structure Mechanics - Department of Chemistry, Materials and Chemical Engineering "Giulio Natta", Politecnico di Milano, Milan, Italy, [3]CNR- IENI Unita' di Lecco, Lecco, Italy

11:15 a.m.
Development of Advanced Nickel-Titanium-Hafnium alloys for Tribology Applications: Mr. Sean Mills[1]**,** Dr. Ronald D Noebe[2], Dr. Christopher Dellacorte[2] and Dr. Aaron Stebner[3], [1]Materials Science and Engineering, Colorado School of Mines, Golden, CO, [2]NASA Glenn Research Center, Cleveland, OH, [3]Mechanical Engineering, Colorado School of Mines, Golden, CO

11:30 a.m.
Analysis of Nitinol Wire Wear Performance: Dr. Paul Briant, Dr. Michael Kimiecik and Dr. Brad James, Exponent, Inc., Menlo Park, CA

11:45 a.m.
Finite Element Analysis on Micromechanical Models of Particle/Void Assemblies in Nitinol Transcatheter Endovascular Devices: Dr. Philipp Hempel, Dr. Annika Sorg and Dr. Markus Wohlschlögel, Admedes Schuessler GmbH, Pforzheim, Germany

12:00 p.m.–1:00 p.m. Lunch

1:00 p.m.–6:30 p.m. Free Time

6:30 p.m.–9:30 p.m. Social Networking Event: Beach Party @ Paradise Cove

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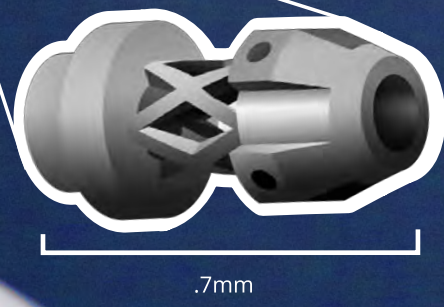

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TECHNICAL PROGRAM

Thursday, May 18, 2017

7:30 a.m. – 5:00 p.m.	Registration Open	Bay View / Sunset Foyer
8:00 a.m. – 8:45 a.m.	Plenary Session: Chris Dellacorte	Sunset Ballroom 4 & 5
8:45 a.m. – 9:30 a.m.	Plenary Session: Benjamin Reedlunn	Sunset Ballrooms 4 & 5
9:30 a.m. – 10:00 a.m.	Morning Refreshment Break	Sunset Ballroom Deck
10:00 a.m. – 11:45 a.m.	Shape Memory Actuators and Superelastic Damping Structures III	Sunset Ballrooms 4 & 5
10:00 a.m. – 11:45 a.m.	Mechanics of Shape Memory Materials: Modeling Meets Experiments II	Sunset Ballrooms 1 – 3
11:45 p.m. – 1:00 p.m.	Lunch	Sunset Terrace
1:00 p.m. – 1:45 p.m.	Plenary Session: Jim Mabe	Sunset Ballrooms 4 & 5
1:45 p.m. – 2:00 p.m.	Mid–Afternoon Refreshment Break	Sunset Ballroom Deck
2:00 p.m. – 3:15 p.m.	Production, Processing, and Standards III	Sunset Ballrooms 4 & 5
2:00 p.m. – 3:15 p.m.	Mechanics of Shape Memory Materials: Modeling Meets Experiments III	Sunset Ballrooms 1 – 3
3:15 p.m. – 3:45 p.m.	Late Afternoon Refreshment Break	Sunset Ballroom Deck
3:45 p.m. – 5:00 p.m.	Designing Next Generation Shape Memory Materials and Forms III	Sunset Ballrooms 4 & 5
3:45 p.m. – 5:00 p.m.	Mechanics of Shape Memory Materials: Modeling Meets Experiments IV	Sunset Ballrooms 1 – 3
5:00 p.m. – 7:00 p.m.	CASMART Student Design Competition	Sunset Pavillion 1

Plenary Session: Christopher Dellacorte & Benjamin Reedlunn
8:00 a.m.-9:30 a.m.
Meeting Room: Sunset Ballroom 4 & 5

8:00 a.m.
NiTi Alloys for Structural and Tribological Applications: The Other Side of Superelastics: Dr. Christopher Dellacorte, NASA Glenn Research Center, Cleveland, OH

8:45 a.m.
Axial-Torsion Behavior of Superelastic NiTi Tubes: Dr. Benjamin Reedlunn[1], Dr. John A. Shaw[2] and Prof. Samantha Daly[2], [1]Sandia National Laboratories, Albuquerque, NM, [2]Aerospace Engineering, University of Michigan, Ann Arbor, MI

9:30 a.m.–10:00 a.m. Morning Refreshment Break

Mechanics of Shape Memory Materials: Modeling Meets Experiments II
10:00 a.m.-11:45 a.m.
Meeting Room: Sunset Ballroom 1-3

Session Chair:
Mr. James H. Mabe
The Boeing Company
Berkeley, MO USA

10:00 a.m.
Effect of Compressive and Tensile Pre-Strains on Durability of Nitinol: Mr. Karthik Senthilnathan, Dr. Ali Shamimi, Lot Vien and Mr. Ich Ong, Confluent Medical Technologies, Fremont, CA

10:30 a.m.
Size Effects in Shape Memory Alloys: Competition Between Structural and Microstructural Features in Determining Grain Scale Performance: Mr. Partha Paul[1], Dr. Harshad Paranjape[2], Dr. Aaron Stebner[2], Prof. Peter M Anderson[3] and Dr. L. Catherine Brinson[1], [1]Mechanical Engineering, Northwestern University, Evanston, IL, [2]Mechanical Engineering, Colorado School of Mines, Golden, CO, [3]NASA Glenn Research Center, Cleveland, OH

10:45 a.m.
Effect of Low and Reverse Loading Paths on the Actuation Characteristics of Shape Memory Alloy Torsional Actuators: Mr. Micheal Bass, Mr. Douglas Nicholson and **Mr. James H. Mabe**, The Boeing Company, Berkeley, MO

11:00 a.m.
Effect of Mean Strain and Pre-Strain on Fatigue Strength of Superelastic Nitinol: Dr. Hengchu Cao, Dr. Yixin Xu, Dr. Fei Zhou and Dr. Ming H. Wu, Edwards Lifesciences, Irvine, CA

11:15 a.m.
Effect of Variable Amplitude Blocks Ordering in the Functional Fatigue of Superelastic NiTi Wires: Prof. Alejandro Yawny[1] and **Dr. Hugo Soul**[2], [1]CNEA / CONICET, Physics of Metals Division, Centro Atomico Bariloche (CNEA), S. C. de Bariloche, Argentina, [2]CONICET, Physics of Metals Division, Centro Atomico Bariloche (CNEA), S. C. de Bariloche, Argentina

11:30 a.m.
Volume Weighted Probabilistic Methods for Nitinol Lifetime Prediction: Mr. Craig Bonsignore[1], Mr. Karthik Senthilnathan[2] and Dr. Ali Shamimi[3], [1]Confluent Medical Technologies, Fremont, CA, [2]NDC, Fremont, CA, [3]R&D, NDC, Fremont, CA

Shape Memory Actuators, Caloric, and Superelastic Damping Devices III
10:00 a.m.-11:45 a.m.
Meeting Room: Sunset Ballroom 4 & 5

Session Chair:
Dr. Frederick Tad Calkins
The Boeing Company
Seattle, WA USA

10:00 a.m.
Spatially Distributed Actuation of Shape Memory Alloy Knitted Composites: Mr. Timothy James Anderson and Dr. Julianna Abel, Mechanical Engineering, University of Minnesota, Minneapolis, MN

10:15 a.m.
Novel Monolithic Shape Memory Alloy (SMA) Actuator with an Embedded Strain Gauge Sensor: Mr. Nima Zamani[1,2], Dr. Behrad Khamesee[2] and Dr. Mohammad Ibraheem Khan[3], [1]Acutation, Smarter Alloys, Waterloo, ON, Canada, [2]MME, university of Waterloo, Waterloo, ON, Canada, [3]Smarter Alloys, Waterloo, ON, Canada

10:30 a.m.
Development and Testing of a Shape Memory Alloy-Driven Composite Morphing Radiator: Mr. Christopher L. Bertagne[1], Mr. Matthew Wescott[1], Ms. Lisa Renee Erickson[2], Dr. Othmane Benafan[3], Dr. John D. Whitcomb[1] and Dr. Darren J. Hartl[4], [1]Aerospace Engineering Department, Texas A&M University, College Station, TX, [2]Thermal Systems Branch (EC6), NASA Johnson Space Center, Houston, TX, [3]NASA Glenn Research Center, Cleveland, OH, [4]Aerospace Vehicle Systems Institute, Texas A&M Engineering Experimentation Station, College Station, TX

10:45 a.m.
Development and Performance of Multi-Wire Shape Memory Effect Actuators: Dr. Andrew Jardine, Shape Change Technologies, Thousand Oaks, CA

11:15 a.m.
Integrated Electromagnetic Heating and Fluid Cooling in SMA Actuators via Liquid Metal Circuits: Mr. Jacob Mingear[1], Mr. Brent Bielefeldt[1] and **Dr. Darren J. Hartl**[2], [1]Aerospace Engineering, Texas A&M University, College Station, TX, [2]Aerospace Vehicle Systems Institute, Texas A&M Engineering Experimentation Station, College Station, TX

11:45 a.m.–1:00 p.m. Lunch

Plenary Session: Jim Mabe
1:00 p.m.-1:45 p.m.
Meeting Room: Sunset Ballroom 4 & 5

1:00 p.m.
Challenges towards Successful Integration and Test of SMA Aerospace Applications: Mr. James H. Mabe, The Boeing Company, Berkeley, MO

Mechanics of Shape Memory Materials: Modeling Meets Experiments III
2:00 p.m.-3:15 p.m.
Meeting Room: Sunset Ballroom 1-3

Session Chair:
Dr. Harshad Paranjape
Colorado School of Mines
Golden, CO USA

2:00 p.m.
Numerical Study of the Plasticity-Induced Stabilization Effect on Martensitic Transformations in Shape Memory Alloys: Dr. Philipp Junker[1], Dr. Philipp Hempel[2], Dr. Annika Sorg[2], Dr. Markus Wohlschlögel[2] and Prof. Klaus Hackl[3], [1]Computational Engineering, Ruhr-Universitaet Bochum, Bochum, Germany, [2]Admedes Schuessler GmbH, Pforzheim, Germany, [3]Computational Engineering, Ruhr-Universitaet Bochum, Bochum, Germany

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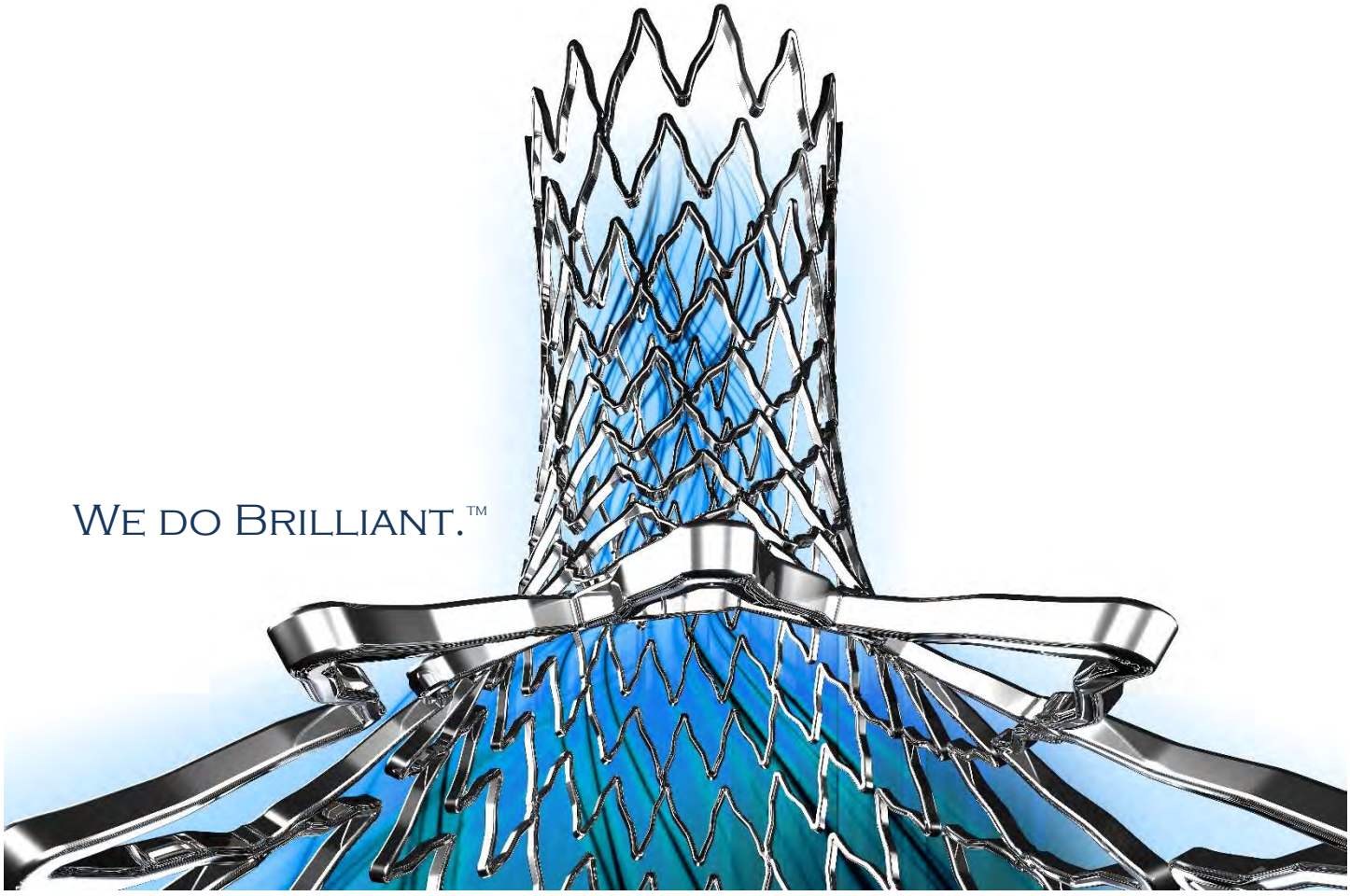

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2:15 p.m.
A Fast and Easy-to-Calibrate Model for the Cyclic Material Behavior of Shape Memory Alloys: Prof. Klaus Hackl, Mrs. Johanna Waimann and Dr. Philipp Junker, Computational Engineering, Ruhr-Universitaet Bochum, Bochum, Germany

2:30 p.m.
A Micromechanical Model For Textured Polycrystalline Ni-Ti Wires: Mr. Philippe Hannequart[1,2], Dr. Michael Peigney[1] and Dr. Jean-François Caron[1], [1]Laboratoire Navier, Ecole des Ponts ParisTech, Marne-la-Vallee cedex 2, France, [2]Arcora, Groupe Ingerop, Rueil Malmaison, France

2:45 p.m.
A Robust Macroscopic Finite Element Model Implementation for Coupled Phase Transformation and Plastic Deformation in Shape Memory Alloys: Dr. Harshad Paranjape[1], Prof. Kaushik Bhattacharya[2] and Dr. Aaron Stebner[1], [1]Mechanical Engineering, Colorado School of Mines, Golden, CO, [2]Department of Mechanical and Civil Engineering, California Institute of Technology, Pasadena, CA

3:00 p.m.
Simulation Of Tube Drawing Textures In Nickel Titanium Using Visco-Plastic Self Consistent (VPSC) Algorithm: Mr. Shivram Sridhar and Prof. Anthony Rollett, Materials Science and Engineering, Carnegie Mellon University, Pittsburgh, PA

Production, Processing, and Standards III
2:00 p.m.-3:15 p.m.
Meeting Room: Sunset Ballroom 4 & 5

Session Chair:
Mr. Chris Bräuner
Admedes Schuessler GmbH
Pforzheim, Germany

2:00 p.m.
Ultrafast Laser Cutting of Low Mass Superelastic Nitinol Parts: Dr. Michael Shirk, PhD., J.E. Harrington, Ms. Christine Trépanier and Dr. Tom Duerig, Confluent Medical Technologies, Fremont, CA

2:30 p.m.
Characterization of Laser-Generated Surface Layers: Heat-Affected Zone (HAZ) and Recast: Mr. Chris Bräuner, Dr. Markus Wohlschlögel and Dr. Nils-Agne Feth, Admedes Schuessler GmbH, Pforzheim, Germany

2:45 p.m.
Nitinol Micro Machining Utilizing Ultra-Short Pulse Lasers: Dr. Nils-Agne Feth, Dr. Markus Wohlschlögel and Mr. Chris Bräuner, Admedes Schuessler GmbH, Pforzheim, Germany

3:00 p.m.
Heat-Affected Zone Analysis for Laser-Cut and Micro-electrical Eischarge Machined Nitinol: Mr. James Wamai Mwangi[1], Dr. Henning Zeidler[1], Dr. Markus Wohlschloegel[2], Chris Braeuner[2] and Prof. Andreas Schubert[1], [1]Micromanufacturing Technology, Technische Universitaet Chemnitz, Chemnitz, Germany, [2]Admedes Schuessler GmbH, Pforzheim, Germany

Designing Next Generation Shape Memory Materials and Forms: Beyond Nitinol III
3:45 p.m.-4:45 p.m.
Meeting Room: Sunset Ballroom 4 & 5

Session Chair:
Dr. Jeremy E. Schaffer
Fort Wayne Metals Research Products Corporation
Fort Wayne, IN USA

3:45 p.m.
Intelligent Design With Fine Diameter Nitinol Wire Over Wide Performance Spectra: Dr. Jeremy E. Schaffer[1], Dr. S. Cai[2], Mr. Dave Plumley[3] and Mr. Drew J Forbes[1], [1]Research and Development, Fort Wayne Metals Research Products Corporation, Fort Wayne, IN, [2]Fort Wayne Metals Research Products Corporation, Fort Wayne, IN, [3]Product Management, Fort Wayne Metals, Fort Wayne, IN

4:00 p.m.
Composition, Compatibility, and the Mechanical Performance of Ternary NiTiX Shape Memory Alloys: Ms. Ashley N. Bucsek[1], Mr. Glen S Bigelow[2], Dr. Ronald D Noebe[2] and Dr. Aaron Stebner[1], [1]Mechanical Engineering, Colorado School of Mines, Golden, CO, [2]NASA Glenn Research Center, Cleveland, OH

4:15 p.m.
Alloy Design For NCAXB-Type Ferrous Superelastic Alloys: Mr. Cheng Zhang and Kenneth Vecchio, University of California, San Diego, CA

4:30 p.m.
Microstructural Effect on the Superelastic Behavior of Polycrystalline NCAXB-Type Ferrous Alloys: Mr. Cheng Zhang and Kenneth Vecchio, University of California, San Diego, CA

Mechanics of Shape Memory Materials: Modeling Meets Experiments IV
3:45 p.m.-4:30 p.m.
Meeting Room: Sunset Ballroom 1-3

Session Chair:
Dr. Harshad Paranjape
Colorado School of Mines
Golden, CO USA

3:45 p.m.
Macroscopic Martensitic Transformation Front in NiTi Shape Memory Alloys: Experimental Observations and Numerical Reconstruction: Mr. Pavel Sedmák[1,2], Dr. Ludek Heller[1], Dr. Petr Sittner[1], **Dr. Miroslav Frost**[3] and Dr. Petr Sedlák[3], [1]Institute of Physics, CAS, Prague, Czech Republic, [2]ESRF, Grenoble, France, [3]Institute of Thermomechanics, CAS, Prague, Czech Republic

4:15 p.m.
FEA Study of the Influence of Modified Surface Layers on Local Mechanical Properties of Nitinol: Dr. Annika Sorg, Dr. Philipp Hempel, Dr. Markus Wohlschlögel and **Mr. Christoph Degel**, Admedes Schuessler GmbH, Pforzheim, Germany

4:30 p.m.
Characterization of Laser-Welded Nitinol: Mr. Gunter Gläßel, Mr. Julian Duttenhofer, Dr. Markus Wohlschlögel, Dr. Philipp Hempel, Mr. Chris Bräuner and **Dr. Nils-Agne Feth**, Admedes Schuessler GmbH, Pforzheim, Germany

4:45 p.m.
Understanding Complex Stress States in Pseudoelastic Shape Memory Alloys—Macroscopic Modeling Considering Localization and Tension-Compression Asymmetry: Ms. Mina Pouya and Prof. Martin F.-X. Wagner, Technische Universitaet Chemnitz, Chair of Materials Science, Chemnitz, Germany

Friday, May 19, 2017

7:30 a.m. – 12:00 p.m.	Registration Open	Bay View / Sunset Foyer
8:00 a.m. – 8:45 a.m.	Plenary Session: Qingping Sun	Sunset Ballrooms 4 & 5
8:45 a.m. – 9:30 a.m.	Surface Engineering & Corrosion I	Sunset Ballrooms 4 & 5
8:45 a.m. – 9:30 a.m.	Microstructure Characterizations of Materials II	Sunset Ballrooms 1 – 3
9:30 a.m. – 9:45 a.m.	Refreshment Break	Sunset Ballroom Deck
10:00 a.m. – 11:45 a.m.	Surface Engineering & Corrosion II	Sunset Ballrooms 4 & 5
10:00 a.m. – 12:00 p.m.	Material & Device Testing	Sunset Ballrooms 1 – 3

Plenary Session: Qingping Sun
8:00 a.m.-8:45 a.m.
Meeting Room: Sunset Ballroom 4 & 5

8:00 a.m.
Control property and Behavior of Nano-Structured NiTi SMAs by Grain Size Engineering: Prof. Qingping Sun, Mechanical Engineering, Hong Kong University of Science and Technology, Hong Kong, China

Microstructure Characterizations of Shape Memory Materials II
8:45 a.m.-9:30 a.m.
Meeting Room: Sunset Ballroom 1 - 3

Session Chair:
Ms. Ashley N. Bucsek
Colorado School of Mines
Golden, CO USA

8:45 a.m.
Nitinol Microstructural Characteristics Analyzed by Combined Focused Ion Beam and Scanning Electron Microscopy: Dr. Markus Wohlschlögel[1], Mr. Chris Bräuner[1], Dr. Nils-Agne Feth[1], Mr. Tim Schubert[2], Dr. Timo Bernthaler[2], Dr. Alwin Nagel[3] and Prof. Gerhard Schneider[2], [1]Admedes Schuessler GmbH, Pforzheim, Germany, [2]Materials Research Institute, Aalen University, Aalen, Germany, [3]Matworks GmbH, Aalen, Germany

9:00 a.m.
Selective Conversion of NiTi to NiTiZr High Temperature Shape Memory Alloy: Mr. Nima Zamani[1], Dr. Michael L Kuntz[2], Dr. Behrad Khamesee[3] and Dr. Mohammad Ibraheem Khan[2], [1]Acutation, Smarter Alloys, Waterloo, ON, Canada, [2]Smarter Alloys, Waterloo, ON, Canada, [3]MME, university of Waterloo, Waterloo, ON, Canada

9:15 a.m.
Effects of Milling and Annealing on Formation and Structural Characterization of Nanocrystalline Intermetallic Compounds from Ni–Ti-Cu Elemental Powders: Dr. Morteza Ghadimi, Young Researchers and Elites Club, Science and Research Branch, Islamic Azad University, Tehran, Iran, Tehran, Iran (Islamic Republic of)

Surface Engineering and Corrosion I
8:45 a.m.-9:30 a.m.
Meeting Room: Sunset Ballroom 4 & 5

Session Chairs:
Dr. Shari Nathanson Rosenbloom
W. L. Gore & Associates, Inc.
Flagstaff, AZ USA

Ms. Christine Trépanier
Confluent Medical Technologies
Fremont, CA USA

8:45 a.m.
High-Precision Surface Analysis of NiTi by Glow Discharge Optical Emission Spectroscopy: Dr. Andreas Undisz, Mr. Robert Hanke, Mrs. Katharina E. Freiberg and Prof. Markus Rettenmayr, Metallic Materials, Friedrich Schiller University, Jena, Germany

9:00 a.m.
The Use of ASTM F3044-14 to Assess the Galvanic Corrosion Behavior of Nitinol: Ms. Hannah Blaich[1], Ms. Siobhan Carroll[2], Ms. Carolyn Woldring[3], Ms. Stefanie Van Alstine[3], Mr. Minh Phan[2], Ms. Michelle Jung[2] and Dr. Alan R. Pelton[1], [1]G. RAU Inc., Santa Clara, CA, [2]Boston Scientific, Los Gatos, CA, [3]Boston Scientific, Maple Grove, MN

9:15 a.m.
Size Effects in Corrosion Behavior of Electropolished Nitinol—Neurovascular Implants versus Heart Valve Frames: Dr. Markus Wohlschlögel, Mrs. Kerstin Stöffler, Mr. Chris Bräuner and Dr. Nils-Agne Feth, Admedes Schuessler GmbH, Pforzheim, Germany

Material and Device Testing
10:00 a.m.-12:00 p.m.
Meeting Room: Sunset Ballroom 1-3

Session Chair:
Dr. Neil Morgan
Advaniti
United Kingdom, United Kingdom

10:00 a.m.
Straightforward Downsizing of Inclusions in NiTi Alloys: A New Generation of SMA Wires with Outstanding Fatigue Life: Dr. Alberto Coda, Mr. Andrea Cadelli, Mr. Matteo Zanella and Mr. Luca Fumagalli, SAES Getters S.p.A, Lainate, Italy

10:15 a.m.
Effect of Applied Stress during Annealing on the Mechanical Behaviors of NiTiNol Wires: Dr. Xu Huang[1], Dr. Yunxiang Tong[2] and Mr. Michael Ehrlinspiel[3], [1]Mechanical Engineering, Yale University, New Haven, CT, [2]College of Materials Science and Chemistry Engineering, Harbin Engineering University, Harbin, China, [3]Memry Corporation, Bethel, CT

10:30 a.m.
A Torsion Based Fatigue Behavior of Nitinol Tube: Mr. Michael Ehrlinspiel[1], Mr. X. Huang[1], Mr. Andrea Cadelli[2] and Dr. Federico Gallino[3], [1]Memry Corporation, Bethel, CT, [2]SAES Getters S.p.A, Lainate, Italy, [3]SAES Getters S.p.A., Lainate, Italy

10:45 a.m.
How the Evolution of the Dynamic Elastic Modulus during Isothermal Tensile Tests Can Bring New Information on Mechanisms Deformation of a NiTi Superelastic Wire: Dr. Thierry Alonso[1,2], Prof. Denis Favier[1,2] and Dr. Gregory Chagnon[1,2], [1]TIMC-IMAG, University Grenoble Alpes, La Tronche, France, [2]TIMC-IMAG, CNRS, La Tronche, France

11:00 a.m.
Behavior of Low Roughness NiTi Wire in Rotary Bending Fatigue: Mr. Chenbing HUANG, Mrs. Amy SHEN and Dr. Dimitri Aslanidis, Lumenous Peiertech, Jiangyin, Jiangsu, China

11:15 a.m.
Characterization of Current and Future Generation Nitinol Wire: Ms. Siobhan Carroll[1], **Mr. Adrian McMahon**[1], Mr. Minh Phan[1], Ali Salahieh[1] and Dr. Jay Yang[2], [1]Boston Scientific, Los Gatos, CA, [2]Independent Nitinol Consultant, Saratoga, CA

11:30 a.m.
Nitinol With Improved Ductility: Dr. Ali Shamimi and Dr. Tom Duerig, Confluent Medical Technologies, Fremont, CA

11:45 a.m.
The Measurement and Interpretation of Transformation Temperatures in Nitinol: Dr. Tom Duerig[1] and Prof. Kaushik Bhattacharya[2], [1]Confluent Medical Technologies, Fremont, CA, [2]Department of Mechanical and Civil Engineering, California Institute of Technology, Pasadena, CA

Surface Engineering and Corrosion II
10:00 a.m.-11:45 a.m.
Meeting Room: Sunset Ballroom 4 & 5

Session Chairs:
Dr. Shari Nathanson Rosenbloom
W. L. Gore & Associates, Inc.
Flagstaff, AZ USA

Ms. Christine Trépanier
Confluent Medical Technologies
Fremont, CA USA

10:00 a.m.
Effects of Fatigue Testing on Nickel Release in Nitinol Stents: Dr. Srinidhi Nagaraja[1], Mr. David Ormonde[2], Dr. Vaishnavi Chandrasekar[1], Mrs. Kristen Lipschultz[2], Mr. Calvin Chao[2] and Mr. Kent Vilendrer[2], [1]Center for Devices and Radiological Health, Food and Drug Administration, Silver Spring, MD, [2]Medical Device Testing Services, Minnetonka, MN

10:15 a.m.
Correlation of In-Vitro Corrosion to In-Vivo Corrosion in Nitinol Stents: Dr. Stacey Sullivan[1], Mr. Daniel Madamba[2], Dr. Maureen Dreher[1], Dr. Shiril Sivan[1], Ms. Christine Trépanier[2] and Dr. Srinidhi Nagaraja[1], [1]Center for Devices and Radiological Health, Food and Drug Administration, Silver Spring, MD, [2]Confluent Medical, Fremont, CA

10:30 a.m.
Blue Oxide—Next Generation Surface Finish II: Mr. Chris Bräuner[1], Dr. Markus Wohlschlögel[1], Dr. Nils-Agne Feth[1], Dr. Andreas Schuessler[2], Dr. Jan Racek[3] and Dr. Petr Sittner[4], [1]Admedes Schuessler GmbH, Pforzheim, Germany, [2]Acandis GmbH u. Co. KG, Pforzheim, Germany, [3]Institute of Physics ASCR, Prague, Czech Republic, [4]Institute of Physics, CAS, Prague, Czech Republic

10:45 a.m.
The Effect of Various Thermally Grown Oxides on the Corrosion Performance of Nitinol: Dr. Shari Nathanson Rosenbloom, Chris Yevcak, Joel Wynne Dugdale, Christopher C. Lasley and Dr. Parikshith Kumar, W. L. Gore & Associates, Inc., Flagstaff, AZ


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11:00 a.m.
Effects of Hydrogen-Charging on the Phase Transformation of Martensitic NiTi Shape Memory Wires: Mr. Yoav Snir[1,2], Mr. Nathan A. Ley[1], Mr. Mathew Carl[1] and **Dr. Marcus L. Young**[1], [1]Materials Science and Engineering, University of North Texas, Denton, TX, [2]Materials Science, NRCN, Beer Sheva, Israel

11:15 a.m.
Shot Peening Process Optimized for Nitinol Medical Devices: Mr. Owen Falk and Dr. Andreas Wick, Confluent Medical Technologies, Fremont, CA

11:30 a.m.
Laser Shock Wave Assisted Patterning on NiTi and NitiHf Shape Memory Alloy Surfaces: Dr. Ali & O Er[1], Prof. H.E. Karaca[2], Mr. Dovletgeldi Seyitliyev[1], Mr. Byron Grant[1], Mrs. Peizhen Li[2] and Mr. Khomidkhodza Kholikov[1], [1]Physics, Western Kentucky University, Bowling Green, KY, [2]Mechanical Engineering, University of Kentucky, Lexington, KY

PARADISE POINT

Sunset Pavilion

Expo Hours

Tuesday, May 16

Exhibits Open	12:00 p.m. – 7:00 p.m.
Lunch on the Exhibit Floor	12:00 p.m. – 1:00 p.m.
Refreshment Break	3:15 p.m. – 3:45 p.m.
Expo Networking Reception	5:30 p.m. – 7:00 p.m.

Wednesday, May 17

Exhibits Open	10:00 a.m. – 1:00 p.m.
Lunch on the Exhibit Floor	12:00 p.m. – 1:00 p.m.

EXHIBITOR LIST

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ATI	35
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Comco Inc.	39
Confluent Medical Technologies	**20**
Element Materials Technology	8
EUROFLEX GmbH	**4**
Fort Wayne Metals Research Products Corp	**37**
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Vascotube GmbH	**22**

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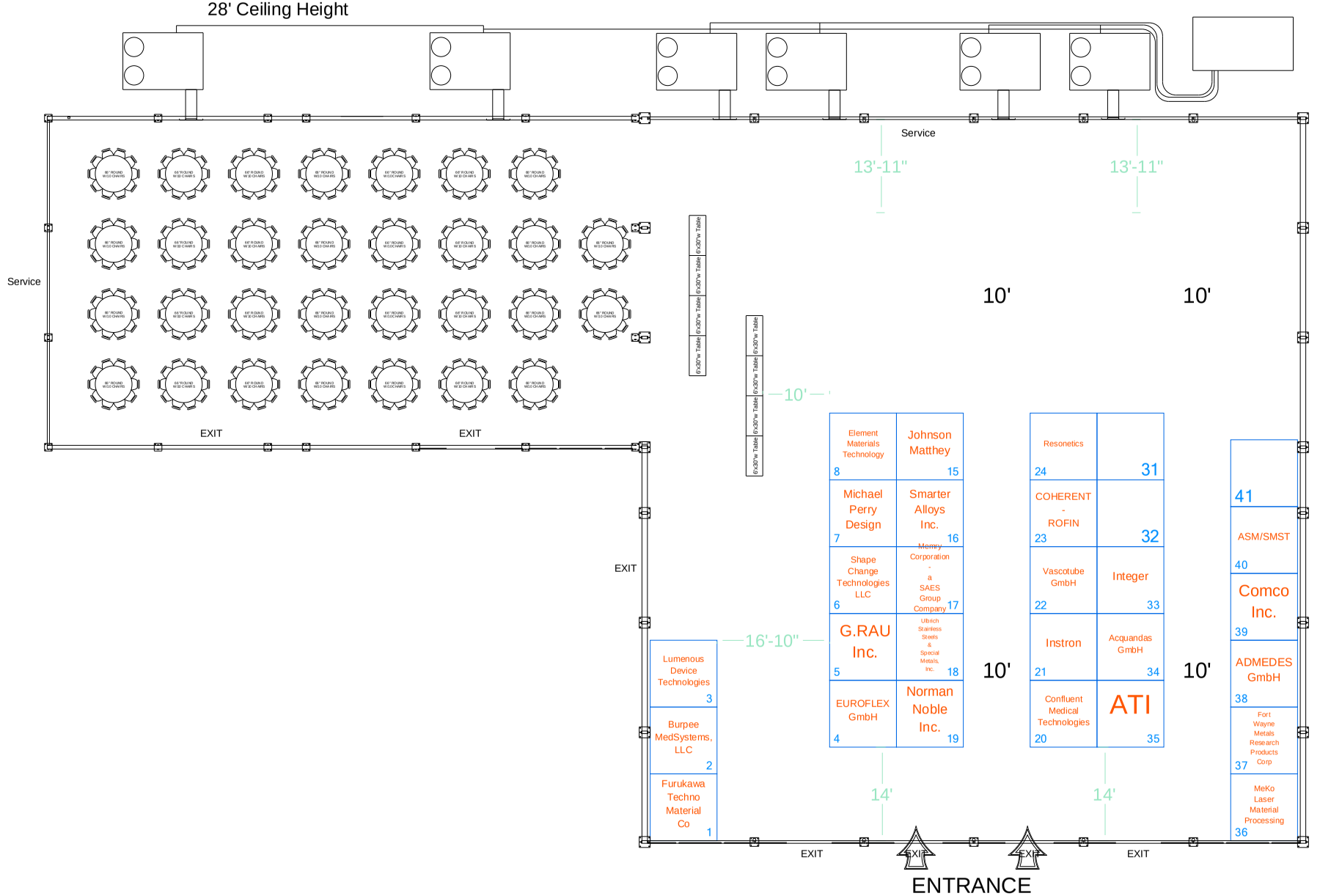

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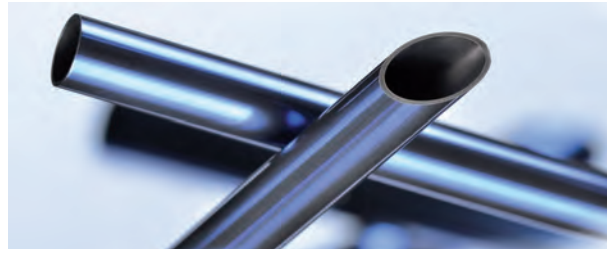

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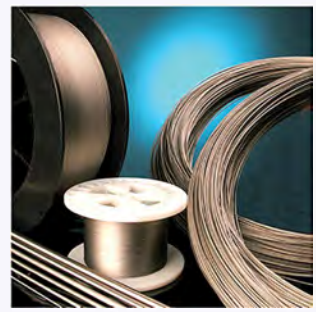

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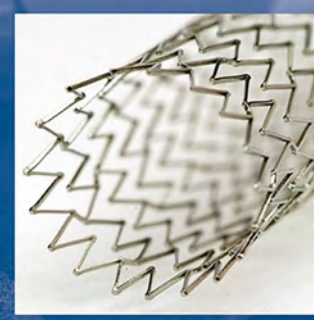

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G.RAU Inc.
Booth # 5
G.RAU Inc. adds new medical device experience to the 140-year-old materials-based expertise of the G.RAU-Group. The G.RAU-Group has an international focus for its customers with headquarters and two production plants in Pforzheim, Germany, one production plant in Costa Rica and now a state-of-the-art test facility in Santa Clara, CA.
www.g-rau.com

Instron
Booth # 21
Instron® is the leading global manufacturer of testing equipment for the material and structural testing markets, used to evaluate materials, from native tissue to advanced high-strength alloys. The global Instron Centers of Excellence ensure that behind every Instron system is an unprecedented commitment and dedication to quality and customer satisfaction.
www.instron.us/en-us

Integer
Booth # 33
Integer™ is one of the largest medical device outsource manufacturers in the world. Representing the union of Greatbatch™ Inc. and Lake Region Medical™, Integer™ offers comprehensive products and services in medical device outsourcing of guidewires, introducers, catheters, and wire and metal-based medical devices for a range of cardiac and endovascular procedures.
www.integer.net

Johnson Matthey
Booth # 15
Johnson Matthey provides medical device components made from nitinol and precious metal alloys. We develop specialized coatings to improve performance and radiopacity. We offer nitinol tubes with an enhanced inner diameter surface suitable for stents and we are a premier supplier of nitinol sheet. We also shape set nitinol components.
www.jmmedical.com

Lumenous Device Technologies
Corporate Sponsor
Booth # 3
Lumenous, The Nitinol Device Experts™. Relentlessly focused on the best device performance, Lumenous develops processes for every purpose in Laser Cutting, Microwelding, Shapesetting, Electropolishing, Nitinol Wire and Tubing, Precision Assembly, and Design Engineering Services. Lumenous offers the TruePhase™ non-contact Af test technology for improved reproducibility, ease-of-use, and quality cost reduction.
www.lumenous.com

MeKo Laser Material Processing
Booth # 36
MeKo is a global ISO-certified contract manufacturer specialized in high precision laser material processing. The company has about 25 years of experience with laser cutting, drilling, welding and post processing services for medical products like stents and heart valve frames made of metal and bioresorbable materials.
ww.meko.de

Memry Corporation
Booth # 17
Memry Corporation provides Nitinol melting materials, a complete range of Nitinol fabrication, and engineer-to-engineer support in both prototyping and production phases. With “melt to market” capabilities under one company roof, medical device customers benefit from precise control, predictability, transparency, and a streamlined process for Nitinol products and solutions.
www.memry.com

Michael Perry Design
Booth # 7
Perry Design is a product development company located in the Silicon Valley. We have extensive experience in Nitinol medical device design, development, and Finite Element Analysis (FEA). We are experienced in a broad range of medical device design serving both new startups and established companies.

Norman Noble, Inc.
Industry Partner
Booth # 19
Norman Noble, Inc. is a single-source supplier for manufacturing of Nitinol based finished Class II and Class III vascular devices in compliance with FDA regulations and ISO 13485. We offer validated manufacturing, electropolishing, and welding processes. NOBLE S.T.E.A.L.T.H. (System To Enable Athermal Laser Techology Haz-free) athermal laser process enables the manufacturing of next generation implants.
http://nnoble.com/

Resonetics
Booth # 27
Resonetics is a leader in laser micromanufacturing. Core capabilities include laser ablating, cutting, drilling, and welding of metal, polymer, and glass components. The company's passion for technology complements its customers’ passions for improving and saving lives. Together, they collaborate to solve complex challenges and develop the next generation of life science devices. Locations: Boston, Costa Rica, Dayton, Minneapolis, and San Diego.
www.resonetics.com

Ulbrich

We Deliver Precision®

Is your memory escaping your shapes?

Ulbrich provides solutions for the most challenging design and manufacturing specifications. Our extensive metallurgical staff and product managers are available to assist you in providing unique alloys such as nitinol, the shape memory alloy, as well as other various stainless, niobium, nickel, titanium and cobalt alloys in the form of precision rolled strip, foil, round, flat and shaped wire for all of your demanding end uses and device needs.

NITINOL CAPABILITIES

- Width: 0.0015” to 1.00”
- Diameters: 0.0007” up to 0.025”
- Thickness: Dependent on Overall Aspect Ratio
- Conditions: As-Drawn Superelastic or Straight Anneal
- Finish: Standard Black Oxide, Oxide Free & Custom Oxides

NITINOL ALLOYS

- Ni-45Ti C (Chrome Doped)
- Ni-45Ti B (Binary)

THE ULBRICH NITINOL ADVANTAGE

- Burr Free Rolled from Round Wire
- Continuous Coils with Fewer Welds
- Oscillate, Spooled, Block & Special Packaging
- Close Dimensional Tolerances
- Select Stock Programs for Quick Turn R&D Trials

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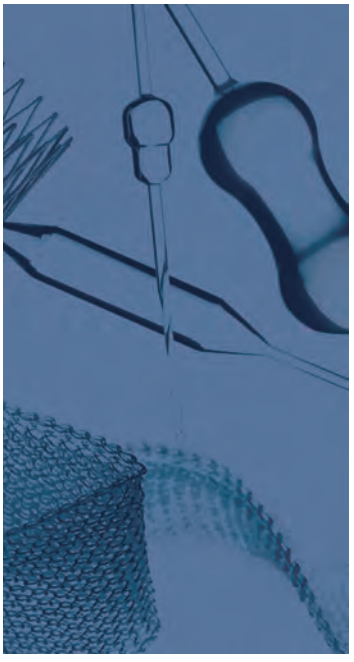
EXHIBITOR COMPANY DESCRIPTIONS

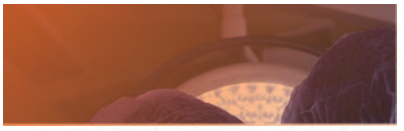
Shape Change Technologies LLC
Booth # 6
Shape Change has developed a Nitinol foam process for bonding Nitinol assemblies into a simple connector. Wire diameters from 25 microns can be easily bonded, including multi-wire Nitinol braids, sheet, foil and tubes. Nitinol foam connectors are simple, robust structural connections, saving you valuable time and enabling new engineering designs.
www.shapechange.com

Smarter Alloys Inc.
Booth # 16
Smarter Alloys is at the forefront of the smart materials revolution. Our unique ability to program shape memory behaviour makes it possible to create complex machine-like function in simple devices. Thanks to Multiple Memory Material technology, we are transforming the design of SMAs used in medical/dental, transportation and consumer industries.
www.smarteralloys.com

Ulbrich Specialty Wire Products
Booth # 18
Ulbrich provides solutions for challenging design and manufacturing specifications. Our metallurgical staff and product managers are available to assist you in providing unique alloys such as nitinol, the shape memory alloy, various stainless, niobium, nickel, titanium and cobalt alloys in the form of precision rolled strip, foil, round, flat and shaped wire.
www.ulbrich.com

Vascotube GmbH
Corporate Sponsor
Booth # 22
Vascotube is a leading manufacturer of Nitinol and CoCr tubing for medical devices. We manufacture exclusively according to customer specification and are supplying leading medical device companies. Our production is managed according to ISO13485 and 9001. Quality controll and inspection include metallurgic microscope, cross section inspection, laser confocal microscope, Af/DSC test and EDX analyse.
www.vascotube.com





CONFLUENT MEDICAL TECHNOLOGIES

SMST 2017

Collaboration Perfected From Prototype to Production

Confluent Medical Technologies is a global leader for the design, development, and manufacturing of innovative medical devices. Our finished device capabilities range from the design and manufacture of Nitinol stents, balloon catheters, implantable textiles and guidewire systems to the development and production of the finest finished medical devices on the market. We lead the way as a single-source supplier that develops groundbreaking products and services for market segments worldwide.

Confluent Medical Technologies capabilities include:

Nitinol Components

- From simple and delicate wireform devices to complex and unique laser cut designs, our manufacturing facilities offer the latest in technological advances to bring your most difficult devices to market.

Balloon Expandable Stents & Balloon Catheters

- Our capabilities span an extensive range of expertise from balloon expandable stents, balloon extrusion, balloon design and forming, to testing and inspection.

Delivery Systems

- Our specialized design, development, and manufacturing of highly precise delivery system components and assemblies is a reflection of our efficient and impeccable assembly processes.

Biomedical Textiles

- We provide a full line of biomedical textile services from concept design to full-scale production, and supply chain management.

Guidewires

- Our custom capabilities allow us to deliver advanced guidewire systems for a variety of diagnostic and therapeutic medical procedures.

Access Kits

- Our extensive capabilities and experience with innovative designs provides an enhanced range of components to meet all challenging access needs.

Confluent Medical Technologies
Headquarters
47533 Westinghouse Drive
Fremont, CA 94539
t 510.683.2000

ConfluentMedical.com

CONFLUENT

WE DO IT *ALL* WITH NITINOL!

Norman Noble, Inc. is your single-source contract manufacturer of Nitinol-based implants and devices.

Norman Noble, Inc. is the largest contract manufacturer of Nitinol based implants and devices. Some examples of the products we manufacture for our customers include:

- **Vascular Stent Implants - Cardio, AAA, Peripheral, Neuro**
- **Transcatheter Heart Valve Implants**
- **Vena Cava Filter Implants**
- **Atrial Appendage Closure Implants**
- **Vascular Closure Implants**
- **Atrial Fibrillation Devices**
- **Renal Denervation Devices**
- **Spinal Implants and Devices**
- **Extremity Screw and Plate Implants and Devices**
- **Ligament Repair Anchors and Devices**

Norman Noble, Inc.
Microprecision Medtech Manufacturing

PRECISION MACHINING OF NITINOL

- Laser ablation, cutting and welding
- Swiss turning
- 5-axis micro milling
- EDM machining

SHAPE SETTING OF NITINOL

- Design For Manufacturing (DFM) services
- Process Development Center (PDC) for prototypes
- Engineering design of form tooling
- Validated thermal processing of superelastic and shape-memory Nitinol

ELECTROPOLISHING OF NITINOL

- Automated electropolishing systems
- Automated passivation systems

TESTING SERVICES FOR NITINOL

- Thermal testing (DSC or BFR)
- Metallurgical cross section analysis
- Force testing and analysis
- Scanning Electron Microscopy with EDX
- Partnered laboratories

PROCESS VALIDATION FOR NITINOL

- Quality engineering team provides strategy, testing and protocols
- IQ/OQ, PQ/PPQ, MSV, TMV, DOE, PFMEA
- Available for all processes, including machining, laser welding, surface finishing, cleaning and other special processes

ASSEMBLY & PACKAGING

- ISO Class 8 cleanroom
- Micro assembly and welding
- Custom packaging and labeling

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