WE DO IT ALL WITH NITINOL!

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

Nitinol, 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

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
- Valicated 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

PHONE: 800-474-4322 • EMAIL: SALES@NORMANNOBLE.NET • WWW.NNOBLE.COM
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.
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 Delalocque 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 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
GENERAL INFORMATION

CONFERENCE REGISTRATION

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

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

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thursday, May 18, 2017</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7:30 a.m. – 5:00 p.m.</td>
<td>Registration Open</td>
<td>Sunset Foyer</td>
</tr>
<tr>
<td></td>
<td>8:00 a.m. – 8:45 a.m.</td>
<td>Plenary Session: Chris Dellacorte</td>
<td>Sunset Ballroom 4 &amp; 5</td>
</tr>
<tr>
<td></td>
<td>8:45 a.m. – 9:30 a.m.</td>
<td>Plenary Session: Benjamin Reedlunn</td>
<td>Sunset 4 &amp; 5</td>
</tr>
<tr>
<td></td>
<td>9:30 a.m. – 10:00 a.m.</td>
<td>Refreshment Break</td>
<td>Meeting Space Foyer</td>
</tr>
<tr>
<td></td>
<td>10:00 a.m. – 11:45 a.m.</td>
<td>Mechanics of Shape Memory Materials: Modeling Meets Experiments II</td>
<td>Sunset Ballroom 4 &amp; 5</td>
</tr>
<tr>
<td></td>
<td>11:45 a.m. – 1:00 p.m.</td>
<td>Lunch</td>
<td>Sunset Terrace</td>
</tr>
<tr>
<td></td>
<td>1:00 p.m. – 1:45 p.m.</td>
<td>Plenary Session: Michele Manuel</td>
<td>Sunset Ballroom 4 &amp; 5</td>
</tr>
<tr>
<td></td>
<td>1:45 p.m. – 2:00 p.m.</td>
<td>Refreshment Break</td>
<td>Meeting Space Foyer</td>
</tr>
<tr>
<td></td>
<td>2:00 p.m. – 3:15 p.m.</td>
<td>Production, Processing, and Standards III</td>
<td>Sunset Ballroom 4 &amp; 5</td>
</tr>
<tr>
<td></td>
<td>2:00 p.m. – 3:15 p.m.</td>
<td>Mechanics of Shape Memory Materials: Modeling Meets Experiments III</td>
<td>Sunset Ballroom 1 – 3</td>
</tr>
<tr>
<td></td>
<td>3:15 p.m. – 3:45 p.m.</td>
<td>Refreshment Break</td>
<td>Meeting Space Foyer</td>
</tr>
<tr>
<td></td>
<td>3:45 p.m. – 5:00 p.m.</td>
<td>Designing Next Generation Shape Memory Materials and Forms III</td>
<td>Sunset Ballroom 4 &amp; 5</td>
</tr>
<tr>
<td></td>
<td>3:45 p.m. – 5:00 p.m.</td>
<td>Mechanics of Shape Memory Materials: Modeling Meets Experiments IV</td>
<td>Sunset Ballroom 1 – 3</td>
</tr>
<tr>
<td></td>
<td>5:00 p.m. – 7:00 p.m.</td>
<td>Design Competition</td>
<td>Sunset Pavilion</td>
</tr>
<tr>
<td><strong>Friday, May 19, 2017</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7:30 a.m. – 12:00 p.m.</td>
<td>Registration Open</td>
<td>Sunset Foyer</td>
</tr>
<tr>
<td></td>
<td>8:00 a.m. – 8:45 a.m.</td>
<td>Plenary Session: Qingping Sun</td>
<td>Sunset Ballroom 4 &amp; 5</td>
</tr>
<tr>
<td></td>
<td>8:45 a.m. – 9:30 a.m.</td>
<td>Surface Engineering &amp; Corrosion I</td>
<td>Sunset Ballroom 4 &amp; 5</td>
</tr>
<tr>
<td></td>
<td>8:45 a.m. – 9:30 a.m.</td>
<td>Microstructure Characterizations of Materials II</td>
<td>Sunset Ballroom 1 – 3</td>
</tr>
<tr>
<td></td>
<td>9:30 a.m. – 10:00 a.m.</td>
<td>Refreshment Break</td>
<td>Meeting Space Foyer</td>
</tr>
<tr>
<td></td>
<td>10:00 a.m. – 12:00 p.m.</td>
<td>Surface Engineering &amp; Corrosion II</td>
<td>Sunset Ballroom 4 &amp; 5</td>
</tr>
<tr>
<td></td>
<td>10:00 a.m. – 12:00 p.m.</td>
<td>Material &amp; Device Testing</td>
<td>Sunset Ballroom 1 – 3</td>
</tr>
</tbody>
</table>

*Programs are tentative: papers, authors and order of presentations are subject to change.*
For a Better Finish

Remove:
• microcracks • laser slag • dross • HAZ • remelt

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

Step 1
Laser cut to desired shape

Step 2
MicroBlast to create a uniform finish

Step 3
Electropolish
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
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.

G.RAU Inc. advises medical customers in the areas of materials selection for their devices with special emphasis on fatigue and corrosion properties of the material. Additionally, G.RAU Inc. offers consultation services on translating “in vivo” physiology to testing protocols for regulatory submittals.

G.RAU Inc. strengthens the G.RAU-Group with its strategic focus and long-term commitment to medical technology. From material selection through development and submission into production, the G.RAU-Group offers its experience and assistance.

G.RAU Inc. offers expert consulting and material testing services:
- Tensile Testing
- Fatigue Testing
- Corrosion Testing
- SEM
- FEA

With a wide spectrum of corrosion and mechanical testing equipment, G.RAU Inc. tests materials, components, and devices:
- Wire, Tubing, Rods
- Medical Devices
- Diamond Samples

www.g-rau.com

G.RAU INC. (G.RAU-GROUP), 3350 Scott Boulevard, Suite 37B, Santa Clara, CA 95054 - USA, info@g-rau.com
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

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.
MeKo Laser Material Processing
Im Kirchenfelde 12-14
31157 Sarstedt / Hannover
Germany
Tel. +49 5066 7079-0
Fax +49 5066 7079-99
Mail Laser@MeKo.de
www.MeKo.de

PROFESSIONAL STENT MANUFACTURING

ALL MATERIALS
NiTi(nol), 316 LVM, L605, ...

Bioresorbables
RESOLOY® Magnesium Polymers (PLLA ...)

Nickel & Cobalt Free
VASCULOY®

VISIT US AT
BOOTH #36

✓ Highest precision and quality
✓ Broad spectrum of postprocessing procedures
✓ ISO-certified quality management
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.

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. Huseyn Sehitoglu, and “In Situ Neutron Diffraction Studies of Increasing Tension Strains of Superelastic Nitinol” by Dr. Alan R. Pelton, Dr. Bjorn Clausen, and Professor Aaron P. Stebner.

### 2016 Best Paper Award

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. Huseyn Sehitoglu, Department of Mechanical Science and Engineering University of Illinois at Urbana-Champaign, Urbana, Illinois, USA.
Your integrated Nitinol supplier.
Because quality saves lives.

Fort Wayne Metals is the world’s leading melt to finish source for Nitinol dedicated to the medical device industry. By controlling the entire process, we ensure the high levels of precision and performance you demand for critical applications. If you’re looking for customizable solutions using Nitinol or other advanced materials, give us a call. We’ll put our commitment to excellence to work for you.
**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**

**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.**
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 aerospace vehicle 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 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.
NEW LOOK. NEW NAME.
SAME OUTSTANDING SERVICE!

ADMEDES Schuessler has changed its name to ADMEDES.

ADMEDES – the leading global provider of finished nitinol self-expandable components to the medical device industry. We collaborate with clients on their designs to develop, commercialize, and produce nitinol and other metal medical implants and device components that meet stringent ISO and FDA standards.

Along with the new name, look, and logo, we have adopted a corporate message that encapsulates our culture... IDEAS. EXPERTISE. PASSION.

Every project begins with an idea – your idea. By working closely with you to define your needs, we use our expertise to take your idea from infancy through to full-scale production. Along the way, you will work with a team of people that has a passion for finding the best way to accomplish your objectives.

info@admedes.com | admedes.com

ADMEDES GmbH  |  Rastatter Str. 15  |  75179 Pforzheim, Germany  |  Phone +49 (0) 7231 92231-0
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.
One day education event and forum of academia and industry.

17th May 2018
Clayton Hotel Galway,
Old Monivea Rd, Ballybrit

Opportunities to engage.

Corporate and academic sponsorship & engagement opportunities include:

- Commitments to a Set # Attendees
- Sponsorship Commitments of Social Events and Pub Hour (E.G. €500-5000) in Exchange For Logo Display at the Event
- Short Talk Commitments for a 15 Minute Presentation on:
  - New Applications, Open Challenges, and Emerging Solutions in Design with SMA & NiTi
  - Commitment to Sponsor a Poster and/or Tabletop to be Displayed During the Open Discussion and Pub Event Social

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!
### TECHNICAL PROGRAM

#### Tuesday, May 16, 2017

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

**Plenary Session: Richard James & Brian Berg**

8:10 a.m. - 9:30 a.m.
Meeting Room: Sunset Ballrooms 4 & 5

**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

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

10:00 a.m.
Precipitation Strengthenable NiTiPd High Temperature Shape Memory Alloys: Mr. Glen S Bigelow¹,
Dr. Anita Garg², Dr. Othmane Benafan³, Dr. Ronald D Noebe⁴, Mr. Darrell J Gaydos⁵ and Dr. Santo A Padula⁶,
¹High Temperature and Smart Materials Branch, NASA Glenn Research Center, Cleveland, OH, ²University of Toledo/NASA Glenn Research Center, Cleveland, OH, ³NASA 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 Lauhoff⁷, Mr. Alexander Paulsen⁸, Dr. Jan Frenzel⁹, Mr. Philipp Krooß¹° and Prof. Thomas Niendorf¹¹, ¹Institute of Materials Engineering, University of Kassel, Kassel, Germany, ²Institute for Materials Science, Ruhr University Bochum, Bochum, Germany
Memry provides nitinol melting and finished components, a complete range of nitinol fabrication and processing, and engineer-to-engineer support in both prototyping and production phases.

With melt to market capabilities, our customers benefit from precise control, predictability, transparency, a streamlined production process and a platform for collaborative innovation.

Visit us at www.memrynitinol.com
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 Carl¹, Mr. Brian Van Doren² and Dr. Marcus L. Young¹, ¹Materials Science and Engineering, University of North Texas, Denton, TX, ²ATI 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 Benafan¹, Mr. Glen S Bigelow¹, Dr. Anita Garg², Dr. Ronald D Noebe¹, Dr. Santo A Padula¹, Mr. Darrel J Gaydosh¹ and Mr. Timothy Halsmer¹, ¹NASA Glenn Research Center, Cleveland, OH, ²University of Toledo/NASA Glenn Research Center, Cleveland, OH, ³Jacobs 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 Grassi¹,², Prof. Denis Favier¹,² and Dr. Gregory Chagnon¹,², ¹TIMC-IMAG, University Grenoble Alpes, La Tronche, France, ²TIMC-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
The International Conference on Shape Memory and Superelastic Technologies (SMST) is the leading worldwide conference and exposition for the shape memory and superelastic technologies and is highly focused on the manufacturing and application of shape memory materials. If you are looking to improve, design, or apply with Nitinol, you will find the preeminent experts at SMST!

Location:
The Bodensee Forum in Konstanz, Germany

SAVE THE DATE:
May 13-17, 2019
TECHNICAL PROGRAM

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. Cai¹ and Dr. Jeremy E. Schaffer², ¹Fort Wayne Metals Research Products Corporation, Fort Wayne, IN, ²Research and Development, Fort Wayne Metals Research Products Corporation, Fort Wayne, IN

2:30 p.m.  
Single Crystal Zirconia Shape Memory Ceramics: Dr. Alan Lai¹ and Prof. Christopher A. Schuh², ¹Massachusetts Institute of Technology, Cambridge, MA, ²Materials 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-ahmadi¹, Mr. Joseph Pauza¹, Dr. Tom Duerig², Dr. Ronald D Noebe³, Dr. Aaron Stebner¹, ²Colorado School of Mines, Golden, CO, ³Confluent Medical Technologies, Fremont, CA

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. Manjeri¹, Rich Lafond¹, Mr. Frank Sczerzenie¹, Dr. Weimin Yin¹, Mr. Grant Brewer², Mr. Andrea Cadelli³ and Dr. Alberto Coda³, ¹SAES Memry, Bethel, CT, ²SAES Getters S.p.A, Lainate, Italy

3:15 p.m.-3:45 p.m. Late Afternoon Refreshment Break
Enhanced Inner Diameter for Nitinol Stent Tubes

Johnson Matthey’s developments to Nitinol stent tubes have improved the Inner Diameter (ID), offering:

- Minimum ID surface defects
- Smooth and uniform ID surfaces.
  Surface Roughness Ra<0.4 microns
- Tailored ID surface conditions, including oxide and oxide free

For more information or for a quote, please contact us: www.jmmedical.com
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 Sittner1, Mr. Pavel Sedmak2,3, Mr. Lukas Kaderavek2,4, Dr. Jan Pilch5, Dr. R. Delville6 and Dr. Ludek Heller7, 1Institute of Physics, CAS, Prague, Czech Republic, 2Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University, Prague, Czech Republic, 3ESRF, Grenoble, France, 4Institute of Physics CAS, Prague, Czech Republic, 5SCK.CEN, Mol, Belgium

4:15 p.m.
Laser Assisted Shape Setting of Superelastic NiTi Wires: Dr. Carlo Alberto Biffi and Dr. Ausonio Tuisi, 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 Telang1, Dr. Roger Dickenson2 and Mr. Arne Rimmereide1, 1R&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 Shanbhag1, Mr. Andrew Michael1, Mr. Siu Kei Tang2, Prof. Y. Norman Zhou1, Dr. Michael L kuntz3 and Dr. Mohammad I Khan4, 1Mechanical and Mechatronics Engineering, University of Waterloo, Waterloo, ON, Canada, 2‘Smarter Alloys, Waterloo, ON, Canada, 3Centre 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 Shamimi1, Dr. Tom Duerig2, Dr. Behnam Aminahmadi3 and Dr. Aaron Stebner1, 1R&D, NDC, Fremont, CA, 2Confluent Medical Technologies, Fremont, CA, 3Colorado 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. Atli1, 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 Eggele, Institute of Materials, Ruhr-University Bochum, Bochum, Germany

4:30 p.m.
Shape Memory Alloys and Elastocaloric Cooling: Prof. Jun Cui1,2, Prof. Ichiro Takeuchi3, Dr. Duane Johnson1 and Dr. Vitalij Pecharsky4, 1Materials Science and Engineering, Ames Laboratory, Ames, IA, 2Iowa State University, Ames, IA, 3Materials Science and Engineering, University of Maryland, College Park, MD

4:45 p.m.
Ultralow-Fatigue of Elastocaloric NiTiCu-Based Thin Films: Prof. Eckhard Quandt1, Mr. Christoph Chluba1, Mr. Lars Bumke1, Dr. Rodrigo Lima de Miranda2, Mr. Julian Strobel1 and Prof. Lorenz Kienle1, 1Materials Science and Engineering, University of Kiel, Kiel, Germany, 2Acquandas GmbH, Kiel, Germany

5:00 p.m.
Numerical Simulations of Temperature-Driven NiTi SMA Actuators: Dr. Petr Sedlak1, Mr. Miroslav Frost1, Mr. Vit Shanel2, Dr. Ludek Heller1, Mr. Lukas Kaderavek1 and Dr. Petr Sittner1, 1Institute of Thermomechanics, CAS, Prague, Czech Republic, 2Institute of Mechanical Engineering, CTU in Prague, Prague, Czech Republic, 3Institute 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
Stop looking at SMA in black and white

See how Smarter Alloys unlocks the full potential of SMA

Our material processing technology will have you looking at SMA applications in a whole new color, visit: www.smarteralloys.com

smarteralloys
making smart materials smarter

1-519-880-0100 ● 75 Bathurst Drive Suite B, Waterloo, Ontario, N2V 1N2, Canada ● info@smarteralloys.com
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 Niccoli¹, C. Garion¹, Dr. Carmine Maletta², Dr. Emanuele Sgambitterra², Prof. Franco Furgiuele² and P. Chiggio², ¹TE-VSC, European Center for Nuclear Research (CERN), Geneva, Switzerland, ²Mechanical, 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 Radial 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 Soria¹, Dr. Hugo Soul² and Prof. Alejandro Yawny³, ¹Fisica de Metales, CONICET, Centro Atomico Bariloche-CNEA, S.C. de Bariloche, Argentina, ²Fisica de Metales, Instituto Balseiro and Centro Atomico Bariloche, San Carlos de Bariloche, Argentina, ³Fisica 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 Brasilia, Brasilia, 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 Garg¹, Dr. Othmane Benafan², Dr. Ronald D Noebe², Dr. H. D. Skorpenske³, Dr. Ke An⁴ and Dr. Norbert Schell⁵, ¹NASA Glenn Research center/ University of Toledo, Cleveland, OH, ²NASA Glenn Research Center, Cleveland, OH, ³Neutron Scattering Science Division, Oak Ridge National Laboratory, Oak Ridge, TN, ⁴Max 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 Ehrlinspiel¹, Mr. X. Huang¹, Mr. Andrea Cadelli² and Dr. Federico Gallino³, ¹Memory Corporation, Bethel, CT, ²SAES Getters S.p.A, Lainate, Italy, ³SAES 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
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.
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 Hayrettin¹, Mr. Sameer Jape², Mr. Serdar Ozguc¹ and Dr. Dimitris C. lagoudas², ¹Material Science and Engineering, Texas A&M University, College Station, TX, ²Aerospace Engineering, Texas A&M University, College Station, TX, ³Aerospace Engineering, Texas A&M University, College Station, TX, ⁴Materials 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 Coda¹, Mr. Andrea Cadelli¹, Mr. Luca Fumagalli¹, Dr. R. M. Manjeri², Dr. Weimin Hin³ and Mr. Frank Sczerzenie⁴, ¹SAES Getters S.p.A, Lainate, Italy, ²SAES Smart Materials, New Hartford, NY

8:45 a.m.  
High Performance Shape Memory Effect Mini Device Realized by Femtosecond Laser Cutting: Dr. Ausonio Tuissi¹, Dr. Carlo Alberto Biffi¹, Dr. Giulia Scalet¹, Dr. Elisa Boatti¹,² and Prof. Ferdinando Auricchio², ¹Institute of Condensed Matter Chemistry and Technologies for Energy, National Research Council of Italy - CNR ICMATE, Lecco, Italy, ²Department of Civil Engineering and Architecture, University of Pavia, Pavia, Italy, ³Harvard 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. Ley¹, Dr. Othmane Benafan² and Dr. Marcus L. Young¹, ¹Materials Science and Engineering, University of North Texas, Denton, TX, ²NASA Glenn Research Center, Cleveland, OH

9:30 a.m.–10:00 a.m. Morning Refreshment Break
8:00 a.m.
Three-Dimensional Measurements of Microstructure Evolution in Martensitic NiTi Using High Energy Diffraction Microscopy: Ms. Ashley N. Bucsek, Dr. Harshad Paranaje, Dr. Darren Dale, Dr. Peter Ko, Dr. Margaret Koker, and Dr. Aaron Stebner, Mechanical Engineering, Colorado School of Mines, Golden, CO, 2Cornell 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, Mr. Brian Van Doren, and Dr. Marcus L. Young, 1Materials Science and Engineering, University of North Texas, Denton, TX, 2ATI 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 Ni51Ti49 Alloy: Mrs. Yuanjuan Li, Dr. Shanshan Cao, Dr. Changbo Ke, Dr. Xiao Ma, Prof. Xin-Ping Zhang, and Mr. Zeng Caiyou, 1South China University of Technology, Guangzhou, China, 2School 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, Dr. Rodrigo Lima de Miranda, Mr. Christoph Chluba, Dr. Eckhard Quandt, Acquandas GmbH, Kiel, Germany, 2Inorganic 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, Mr. Alexander Engel, Dr. Jessica Haupt, Dr. Qian Li, Dr. Rodrigo Lima de Miranda, Prof. Eckhard Quandt, Prof. Georg Lutter, and Prof. Christine Selhuber-Unkel, 1Materials Science, University of Kiel, Kiel, Germany, 2University Hospital of Schleswig-Holstein, Department of Cardiovascular Surgery, Christian-Albrechts-Universitaet zu Kiel, Kiel, Germany

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

11:00 a.m.
At Temperature And Mechanical Functionality Of Nitinol Implantable Medical Devices: Dr. Ming H. Wu, Dr. Yixin Xu, Dr. Fei Zhou, Dr. Hengchu Cao, and Mr. Todd Dickson, 1Edwards Lifesciences, Irvine, CA, 2Lumenous 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, Dr. Christoph Bechtold, Mr. Christoph Chluba, Dr. Christiane Zamponi, and Prof. Eckhard Quandt, 1Acquandas GmbH, Kiel, Germany, 2Inorganic 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, Mr. Rudolf Frei, Dr. Michael Kimieciik, Dr. Paul Briant, Dr. Brad James and Chuan Liu, 1Invariant-Plane Solutions, LLC, Wheeling, IL, 2Vascotube GmbH, Birkenfeld, Germany, 3Exponent, Inc., Menlo Park, CA, 4Northwestern 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. Pelton¹, Mr. Sean M. Pelton¹, Mr. Tim Jörn¹, Dr. Annika Sorg¹, Dr. Jochen Ulmer¹, Mr. Dave Niedermaier¹ and Dr. M.R. Mitchell², ¹G.RAU Inc., Santa Clara, CA, ²Mechanics & 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 Knoll¹, Dr. Jochen Ulmer², Hans Nussknert¹ and Gerhard Sedlmayr¹, ¹G. Rau GmbH & Co. KG, Pforzheim, Germany, ²EUROFLEX GmbH, Pforzheim, Germany

10:45 a.m.
Evaluation Of Different Fatigue Criteria For NiTi Cardiovascular Devices: Mr. Dario Allegretti¹, Prof. Lorezza Petrini², Ms. Francesca Bertini³, Prof. Francesco Migliavacca¹ and Prof. Giancarlo Pennati¹, ¹LaBS - Laboratory of Biological Structure Mechanics - Department of Chemistry, Materials and Chemical Engineering “Giulio Natta”, Politecnico di Milano, Milan, Italy, ²Department of Civil and Environmental Engineering, Politecnico di Milano, Milan, Italy, ³CNR- IENI Unità di Lecco, Lecco, Italy

11:00 a.m.
Development And Experimental Validation Of A Constitutive Model For NiTi Medical Devices Subjected To Fatigue And Plasticity: Prof. Lorenza Petrini¹, Mr. Alessandro Bertini², Dr. Elena Villa³, Dr. Adelaides Nespoli¹ and Prof. Francesco Migliavacca¹, ¹Department of Civil and Environmental Engineering, Politecnico di Milano, Milan, Italy, ²LaBS - Laboratory of Biological Structure Mechanics - Department of Chemistry, Materials and Chemical Engineering “Giulio Natta”, Politecnico di Milano, Milan, Italy, ³CNR- IENI Unità di Lecco, Lecco, Italy

11:15 a.m.
Development of Advanced Nickel-Titanium-Hafnium alloys for Tribology Applications: Mr. Sean Mills¹, Dr. Ronald D Noebe², Dr. Christopher Dellacorte² and Dr. Aaron Stebner³, ¹Materials Science and Engineering, Colorado School of Mines, Golden, CO, ²NASA Glenn Research Center, Cleveland, OH, ³Mechanical 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
TO SEE HOW OUR TECHNOLOGY SAVES LIVES YOU WOULD NEED A MICROSCOPE
See how we can innovate for you

The Leader In Laser Micro Manufacturing For Life Sciences
ABLATING | CUTTING | DRILLING | WELDING

POLYMER | GLASS | METAL
### TECHNICAL PROGRAM

**Thursday, May 18, 2017**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30 a.m. – 5:00 p.m.</td>
<td>Registration Open</td>
<td>Bay View / Sunset Foyer</td>
</tr>
<tr>
<td>8:00 a.m. – 8:45 a.m.</td>
<td>Plenary Session: Chris Dellacorte</td>
<td>Sunset Ballroom 4 &amp; 5</td>
</tr>
<tr>
<td>8:45 a.m. – 9:30 a.m.</td>
<td>Plenary Session: Benjamin Reedlunn</td>
<td>Sunset Ballrooms 4 &amp; 5</td>
</tr>
<tr>
<td>9:30 a.m. – 10:00 a.m.</td>
<td>Morning Refreshment Break</td>
<td>Sunset Ballroom Deck</td>
</tr>
<tr>
<td>10:00 a.m. – 11:45 a.m.</td>
<td>Shape Memory Actuators and Superelastic Damping Structures III</td>
<td>Sunset Ballrooms 4 &amp; 5</td>
</tr>
<tr>
<td>10:00 a.m. – 11:45 a.m.</td>
<td>Mechanics of Shape Memory Materials: Modeling Meets Experiments II</td>
<td>Sunset Ballrooms 1 – 3</td>
</tr>
<tr>
<td>11:45 a.m. – 12:00 p.m.</td>
<td>Lunch</td>
<td>Sunset Terrace</td>
</tr>
<tr>
<td>1:00 p.m. – 1:45 p.m.</td>
<td>Plenary Session: Jim Mabe</td>
<td>Sunset Ballrooms 4 &amp; 5</td>
</tr>
<tr>
<td>1:45 p.m. – 2:00 p.m.</td>
<td>Mid–Afternoon Refreshment Break</td>
<td>Sunset Ballroom Deck</td>
</tr>
<tr>
<td>2:00 p.m. – 3:15 p.m.</td>
<td>Production, Processing, and Standards III</td>
<td>Sunset Ballrooms 4 &amp; 5</td>
</tr>
<tr>
<td>2:00 p.m. – 3:15 p.m.</td>
<td>Mechanics of Shape Memory Materials: Modeling Meets Experiments III</td>
<td>Sunset Ballrooms 1 – 3</td>
</tr>
<tr>
<td>3:15 p.m. – 3:45 p.m.</td>
<td>Late Afternoon Refreshment Break</td>
<td>Sunset Ballroom Deck</td>
</tr>
<tr>
<td>3:45 p.m. – 5:00 p.m.</td>
<td>Designing Next Generation Shape Memory Materials and Forms III</td>
<td>Sunset Ballrooms 4 &amp; 5</td>
</tr>
<tr>
<td>3:45 p.m. – 5:00 p.m.</td>
<td>Mechanics of Shape Memory Materials: Modeling Meets Experiments IV</td>
<td>Sunset Ballrooms 1 – 3</td>
</tr>
<tr>
<td>5:00 p.m. – 7:00 p.m.</td>
<td>CASMART Student Design Competition</td>
<td>Sunset Pavillion 1</td>
</tr>
</tbody>
</table>

---

**Plenary Session: Christopher Dellacorte & Benjamin Reedlunn**

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 Reedlunn¹, Dr. John A. Shaw² and Prof. Samantha Daly³**, Sandia National Laboratories, Albuquerque, NM, 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 Paul¹, Dr. Harshad Paranjape⁴, Dr. Aaron Stebner⁵**, Prof. Peter M Anderson¹ and Dr. L. Catherine Brinson¹, Mechanical Engineering, Northwestern University, Evanston, IL, Mechanical Engineering, Colorado School of Mines, Golden, CO, 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 and Dr. Hugo Soul, CNEA / CONICET, Physics of Metals Division, Centro Atomico Bariloche (CNEA), S. C. de Bariloche, Argentina, 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, Mr. Karthik Senthilnathan and Dr. Ali Shamimi, 1 Confluent Medical Technologies, Fremont, CA, 2 NDC, Fremont, CA, 3 R&D, NDC, Fremont, CA

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, Dr. Behrad Khamese and Dr. Mohammad Ibraheem Khan, 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, Mr. Matthew Wescott, Ms. Lisa Renee Erickson, Dr. Othmane Benafan, Dr. John D. Whitcomb and Dr. Darren J. Hartl, 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, Mr. Brent Bielefeldt and Dr. Darren J. Hartl, Aerospace Engineering, Texas A&M University, College Station, TX, 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

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

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, Dr. Philipp Hempel, Dr. Annika Sorg, Dr. Markus Wohlschlögel and Prof. Klaus Hackl, Computational Engineering, Ruhr-Universitaet Bochum, Bochum, Germany, Admedes Schuessler GmbH, Pforzheim, Germany, Computational Engineering, Ruhr-Universitaet Bochum, Bochum, Germany

5/2/2017 4:07:43 PM
INNOVATION EVERY DAY
RELIABILITY EVERY SECOND

We do Brilliant.

PRODUCTION • DESIGN • PROTOTYPING

MATERIALS • PRECISION ASSEMBLY

TruePhase™
NONCONTACT ACTIVE AF TECHNOLOGY

LUMENOUS Device Technologies, Inc.
Silicon Valley, Shanghai. Brussels
info@lumenous.com
2:15 p.m.
A Fast and Easy-to-Calibrate Model for the Cyclic Material Behavior of Shape Memory Alloys: Prof. Klaus Hackl1, 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 Hannequart1,2, Dr. Michael Peigney1 and Dr. Jean-François Caron1, 1Laboratoire Navier, Ecole des Ponts ParisTech, Marne-la-Vallee cedex 2, France, 2Arcora, 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 Paranjape1, Prof. Kaushik Bhattacharya2 and Dr. Aaron Stebner1, 1Mechanical Engineering, Colorado School of Mines, Golden, CO, 2Department 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

3:00 p.m.
Heat-Affected Zone Analysis for Laser-Cut and Micro-electrical Escharge Machined Nitinol: Mr. James Wamai Mwangi1, Dr. Henning Zeidler1, Dr. Markus Wohlschloegel2, Chris Braeuner2 and Prof. Andreas Schubert1, 1Micromanufacturing Technology, Technische Universitaet Chemnitz, Chemnitz, Germany, 2Admedes 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. Schaffer1, Dr. S. Cai2, Mr. Dave Plumley1 and Mr. Drew J Forbes1, 1Research and Development, Fort Wayne Metals Research Products Corporation, Fort Wayne, IN, 2Fort Wayne Metals Research Products Corporation, Fort Wayne, IN, 3Product 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. Bucsek1, Mr. Glen S Bigelow2, Dr. Ronald D Noebe2 and Dr. Aaron Stebner1, 1Mechanical Engineering, Colorado School of Mines, Golden, CO, 2NASA 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 Sedmák¹, Dr. Ludek Heller¹, Dr. Petr Sittner¹, Dr. Miroslav Frost¹ and Dr. Petr Sedláčk¹, Institute of Physics, CAS, Prague, Czech Republic, ESRF, Grenoble, France, 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. Buczek
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 Wohlschlögel1, Mr. Chris Bräuner1, Dr. Nils-Agne Feth1, Mr. Tim Schubert2, Dr. Timo Bernthal2, Dr. Alwin Nagel1 and Prof. Gerhard Schneider2, 1Admedes Schuessler GmbH, Pforzheim, Germany, 2Materials Research Institute, Aalen University, Aalen, Germany, 3Matworks GmbH, Aalen, Germany

9:00 a.m.
Selective Conversion of NiTi to NiTiZr High Temperature Shape Memory Alloy: Mr. Nima Zamani1, Dr. Michael L Kuntz2, Dr. Behrad Khamesee3 and Dr. Mohammad Ibraheem Khan2, 1Acutation, Smarter Alloys, Waterloo, ON, Canada, 2Smarter Alloys, Waterloo, ON, Canada, 3MME, 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. Freiberger 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 Blaich1, Ms. Siobhan Carroll1, Ms. Carolyn Woldring1, Ms. Stefanie Van Alstine1, Mr. Minh Phan2, Ms. Michelle Jung2 and Dr. Alan R. Pelton1, 1G. RAU Inc., Santa Clara, CA, 2Boston Scientific, Los Gatos, CA, 3Boston 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 Huang1, Dr. Yunxiang Tong2 and Mr. Michael Ehrlinspiel1, 1Mechanical Engineering, Yale University, New Haven, CT, 2College of Materials Science and Chemistry Engineering, Harbin Engineering University, Harbin, China, 1Memry Corporation, Bethel, CT

10:30 a.m.
A Torsion Based Fatigue Behavior of Nitinol Tube: Mr. Michael Ehrlinspiel1, Mr. X. Huang1, Mr. Andrea Cadelli1 and Dr. Federico Gallino1, 1Memry Corporation, Bethel, CT, 2SAES Getters S.p.A, Lainate, Italy, 1SAES 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 Alonso1,2, Prof. Denis Favier1,2 and Dr. Gregory Chagnon1,2, 1TIMC-IMAG, University Grenoble Alpes, La Tronche, France, 2TIMC-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 Carroll1, Mr. Adrian McMahon1, Mr. Minh Phan1, Ali Salahieh1 and Dr. Jay Yang2, 1Boston Scientific, Los Gatos, CA, 2Independent Nitinol Consultant, Saratoga, CA

11:30 a.m.
Nitinol With Improved Ductility: Dr. Ali Shamimi and Dr. Tom Duerig, Confluent Medical Technologies, Fremont, 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 Nagaraja1, Mr. David Ormonde1, Dr. Vaishnavi Chandrasekar1, Mrs. Kristen Lipschultz2, Mr. Calvin Chao2 and Mr. Kent Vilendrer2, 1Center for Devices and Radiological Health, Food and Drug Administration, Silver Spring, MD, 2Medical Device Testing Services, Minnetonka, MN

10:15 a.m.
Correlation of In-Vitro Corrosion to In-Vivo Corrosion in Nitinol Stents: Dr. Stacey Sullivan1, Mr. Daniel Madamba2, Dr. Maureen Dreher1, Dr. Shiril Sivan1, Ms. Christine Trépanier1 and Dr. Srinidhi Nagaraja2, 1Center for Devices and Radiological Health, Food and Drug Administration, Silver Spring, MD, 2Confluent Medical, Fremont, CA

10:30 a.m.
Blue Oxide—Next Generation Surface Finish II: Mr. Chris Bräuner1, Dr. Markus Wohlschlögel1, Dr. Nils-Agne Feth1, Dr. Andreas Schuessler2, Dr. Jan Racek2 and Dr. Petr Sittner1, 1Admedes Schuessler GmbH, Pforzheim, Germany, 2Acandis GmbH u. Co. KG, Pforzheim, Germany, 1Institute of Physics ASCR, Prague, Czech Republic, 1Institute 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
Our **Ni-Ti wires** and **Tubes** satisfy your request!!

For **Medical applications**!!
For **Actuators**!!

**Head Line**

— **“F-ELI” wire** which has **low inclusion**.
  **Furukawa Extra Low Inclusion**

— **Co-Cr** Tubes(L605)

**Get the information**!!
**Touch the Samples**!!
**Visit our booth #1!!**

We are looking forward to meet you at **Furukawa** booth.

**Contacts:**

*US West* : Francine Rios, frios@americanfurukawa.com
*US East* : Roy Lange, langeus@gmail.com
*South America* : Lea J. Frydman, lfrydman@furukawa.com.br
11:00 a.m.
Effects of Hydrogen-Charging on the Phase Transformation of Martensitic NiTi Shape Memory Wires: Mr. Yoav Snir1,2, Mr. Nathan A. Ley3, Mr. Mathew Carl1 and Dr. Marcus L. Young1, 1,2Materials Science and Engineering, University of North Texas, Denton, TX, 3Materials 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 Er1, Prof. H.E. Karaca2, Mr. Dovletgeldi Seyitliyev1, Mr. Byron Grant1, Mrs. Peizhen Li2 and Mr. Khomidkhodza Kholikov1, 1Physics, Western Kentucky University, Bowling Green, KY, 2Mechanical 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

<table>
<thead>
<tr>
<th>2017 COMPANIES</th>
<th>Booth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquandas GmbH</td>
<td>34</td>
</tr>
<tr>
<td>ADMEDES GmbH</td>
<td>38</td>
</tr>
<tr>
<td>ASM/SMST</td>
<td>40</td>
</tr>
<tr>
<td>ATI</td>
<td>35</td>
</tr>
<tr>
<td>Burpee MedSystems, LLC</td>
<td>2</td>
</tr>
<tr>
<td>COHERENT - ROFIN</td>
<td>23</td>
</tr>
<tr>
<td>Comco Inc.</td>
<td>39</td>
</tr>
<tr>
<td>Confluent Medical Technologies</td>
<td>20</td>
</tr>
<tr>
<td>Element Materials Technology</td>
<td>8</td>
</tr>
<tr>
<td>EUROFLEX GmbH</td>
<td>4</td>
</tr>
<tr>
<td>Fort Wayne Metals Research Products Corp</td>
<td>37</td>
</tr>
<tr>
<td>Furukawa Techno Material Co</td>
<td>1</td>
</tr>
<tr>
<td>G.RAU Inc.</td>
<td>5</td>
</tr>
<tr>
<td>Instron</td>
<td>21</td>
</tr>
<tr>
<td>Integer</td>
<td>33</td>
</tr>
<tr>
<td>Johnson Matthey</td>
<td>15</td>
</tr>
<tr>
<td>Luminous Device Technologies</td>
<td>3</td>
</tr>
<tr>
<td>MeKo Laser Material Processing</td>
<td>36</td>
</tr>
<tr>
<td>Memry Corporation - a SAES Group Company</td>
<td>17</td>
</tr>
<tr>
<td>Michael Perry Design</td>
<td>7</td>
</tr>
<tr>
<td>Norman Noble Inc.</td>
<td>19</td>
</tr>
<tr>
<td>Resonetics</td>
<td>27</td>
</tr>
<tr>
<td>Shape Change Technologies LLC</td>
<td>6</td>
</tr>
<tr>
<td>Smarter Alloys Inc.</td>
<td>16</td>
</tr>
<tr>
<td>Ulbrich Stainless Steels &amp; Special Metals, Inc.</td>
<td>18</td>
</tr>
<tr>
<td>Vascotube GmbH</td>
<td>22</td>
</tr>
</tbody>
</table>

*as of 4-19-17; *Bold Denotes Sponsor
High-quality semi-finished products, components & actuators for the medical industry

Companies in the field of medical technology have diverse requirements when it comes to the materials used in their products. EUROFLEX offers a wide range of materials that are known for their innovation and quality. EUROFLEX is a leading global supplier of high-grade semi-finished products, components and actuators from a variety of materials for medical and industrial applications. Preferred in the field of medical technology, our semi-finished products are the foundation for implants such as vascular stents and filters, and a wide variety of other flexible medical instruments. Partnering with you, we develop the next generation creative solutions using innovative materials.

NITINOL, NITINOL-ELI
HIGH-CYCLE FATIGUE NITINOL HCF-SE
STAINLESS STEEL, NI-FREE ALLOYS
COBALT-BASED ALLOYS
TITAN-BASED ALLOYS
TANTALUM
PRECIOUS METALS
PLATINUM ALLOYS
BIOABSORBABLE ALLOYS
MATERIAL COMPOUNDS ...

ELEMENTS OF SHAPE MEMORY ALLOYS
Products can be made to customer specifications such as compression springs, extension springs, bending strips and free-form bending parts out of wire. Preferred materials are different grades of nickel-titanium alloys. Further information about possible uses of these materials in medical technology is available on

www.euroflex.de
THANK YOU TO OUR SPONSORS

Thank you to our Industry Partner:

Norman Noble, Inc.
Microprecision Medtech Manufacturing

Thank you to our Corporate Sponsors:

BURPEE
Medsystems

CONFLUENT

EUROFLEX
WE CREATE SOLUTIONS

FORT WAYNE METALS
Turning knowledge into solutions.

LUMINOUS
DEVICES

VascoTube
Finest Tubes for Medical Devices

Thank you to our Corporate Supporters:

ADMEDES
IDEAS. EXPERTISE. PASSION.

FLEXINOL
www.dynaalloy.com

Johnson Matthey

MEMRY

Resonetics
The leader in laser micro manufacturing for life sciences

SmarterAlloys
making smart materials smarter
EXHIBITOR COMPANY DESCRIPTIONS

Acquandas GmbH
Booth # 34
www.aquandas.com

ADMEDES GmbH
Booth # 38
ADMEDES – the leading global provider of finished nitinol self-expandable components to the medical device industry. We collaborate with clients on their designs to develop, commercialize, and produce nitinol and other metal medical implants and device components that meet stringent ISO and FDA standards.
www.admedes.com

ATI
Booth # 35
ATI (Allegeny Technologies Incorporated) is one of the largest, most diversified specialty metals producers in the world with a reliable, secure supply chain for nitinol and other high temperature shape memory alloys. ATI also supplies other high purity titanium, hafnium, niobium, vanadium and zirconium alloys to the medical market.
www.ATImetals.com

Burpee MedSystems, LLC
Booth # 2
Burpee MedSystems is a company of highly skilled engineers and technicians committed to the development and contract manufacturing of high quality medical devices. We are one of the few companies that offers both catheter and stent manufacturing, eliminating numerous costs to our customers.
www.burpeemedsystems.com

COHERENT – ROFIN
Booth # 23
Coherent | Rofin have been developing laser solutions for medical device manufacturing for more than four decades now. In our application labs we work with a whole range of laser systems, latest fiber and ultrashort pulse laser technology. Coherent | Rofin is a global operating company with production, sales and service sites all over the world.
www.coherent.com

Comco Inc.
Booth # 39
Comco is an industry leader in MicroBlasting technology and creator of the award-winning MicroBlaster®. MicroBlasting removes microcracks, laser slag, dross, HAZ and remelt on laser cut parts. It is also used to texture, deburr and alter part surfaces for medical device manufacturing, precision machining and the aerospace industry.
www.comcoinc.com

Confluent Medical Technologies
Corporate Sponsor
Booth # 20
Confluent Medical Technologies is dedicated to working collaboratively with our customers, taking their projects from rapid prototype into high volume production. Our unparalleled technical expertise, proven experience and partnership with our clients has allowed us to deliver world-class medical devices through innovative material science, engineering, and manufacturing.
https://confluentmedical.com/

Element Materials Technology
Booth # 8
MDT is an A2LA accredited/ISO 17025 certified medical device testing company with over $6 million in commercial fatigue and durability test systems, inspection instruments, and test fixtureing inventory. Our customers have used our testing services and data in hundreds of successful submissions to the FDA, CE and other regulatory bodies.
www.devicetesting.com/

EUROFLEX GmbH
Corporate Sponsor
Booth # 4
EUROFLEX is a globally leading supplier of high-grade semi-finished products, components and actuators from a variety of materials. Fast sample production, customer support from the sample to serial production as well as extensive analysis and investigation methods are part of the services of the company. We are your strategic partners helping you to create solutions.
www.euroflex.de

Fort Wayne Metals Research Products Corp
Corporate Sponsor
Booth # 38
Fort Wayne Metals is an expert manufacturer of precision fine wire, centerless ground bar, strands, cables, metal-to-metal composites and subassemblies for the medical device industry. The company works with stainless steel, high-performance alloys, titanium, and Nitinol. FDA registered and ISO 9001 and AS9100 certified.
www.fwmetals.com

Furukawa Techno Material Co., Ltd.
Booth # 1
Furukawa offers a full range of NiTi (Nitinol) Tubes & Wires made from in-house melting furnace and integrated production, which guarantees 100% traceability. Our technique & experience ensures homogeneous alloy, excellent performance and superior durability. Furukawa launched special wire “F-ELI”, which yields less inclusion than 1/2 of ASTM F2063-12 requirement!!
Specialty Materials for Shape Memory & Superelastic Applications

ATI offers the medical, aerospace, automotive and industrial markets low-carbon, shape memory and superelastic nickel-titanium alloys; including ATI NiTi, ATI NiTiFe™, ATI NiTiNb™, ATI NiTiHf™ and ATI Ni40Ti™.

ATImetals.com
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
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.
www.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 Technology 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
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

**VISIT US AT BOOTH 18!**

ULBRICH.COM
1(800) 243-1676
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 control and inspection include metallographic microscope, cross section inspection, laser confocal microscope, AF/DSC test and EDX analysis.
www.vascotube.com
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.
WE DO IT ALL WITH NITINOL!

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

- 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

**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
- Valicised 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

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

SHAPE MEMORY & SUPERELASTIC TECHNOLOGIES
CONFERENCE & EXPOSITION

FINAL PROGRAM

ORGANIZED BY: