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CONTENTS

Scroll to the title and Click on it to link to the paper. After viewing the paper, use the bookmarks to the left to return to the beginning of the Contents.

Medical Applications 1

5/19/2015 • 9:15 a.m.

Failure Mode Analysis of Nitinol Medical Devices—Fractography of Stent Structures

Chris Bräuner, Florian Weidner, Markus Wohlschlägel, and Andreas Schüßler
ADMEDES Schuessler GMBH, Pforzheim, Germany

Comparison of the Behavior of Product Specific Parameters for a Nitinol Heart Valve Frame Produced with Two Different Kinds of Standard Shape Set Processing—Fluidized Bed vs. Liquid Salt Bath

Chris Bräuner, Markus Wohlschlägel, and Andreas Schüßler
ADMEDES Schuessler GMBH, Pforzheim, Germany

The Competition Between R and M Martensites in Nitinol Medical Devices

Tom Duerig¹ and K. Bhattacharya²
(1) Nitinol Devices and Components
(2) California Institute of Technology

Influence of Storage Conditions on Clinically Relevant Properties of Peripheral NiTi Stents

M. Frotscher and M. Kiekbusch, Cortronik GmbH

Design of a Shape Memory Alloy Self-Expanding Stent Via Open Source Optimization Methods

Thibaut Brosse¹ and Darren J. Hartl²
(1) Ecole Nationale d'Ingénieurs de Saint Etienne
(2) Texas A&M University

Fatigue 1

5/19/2015 • 11:15 a.m.

FEA Study of the Impact of the Shape Setting Strategy on the Fatigue Performance of Nitinol Vascular Implants

Philipp Hempel, Michael Wind, Markus Wohlschlägel, and Andreas Schüßler
ADMEDES Schuessler GmbH

A Direct Method For Predicting The High-Cycle Fatigue Regime In SMAs—Application To Nitinol Stents

Michael Peigney, Université Paris-Est, Laboratoire Navier

Environmentally Induced Cracking of Superelastic NiTi Wires during Tensile Cycling in Simulated Biofluid

Jan Racek, Marc Stora, Petr Šittner, Ludek Heller, and Jan Pilch, Academy of Sciences of the Czech Republic

Fatigue Crack Growth in Shape Memory Alloys

Huseyin Sehitoglu, University of Illinois

Effect of Prestrain on Nitinol Fatigue Life

Ali Shamimi and Kelly Pike, R&D, NDC

Impact of Hydrogen on the Fatigue Behavior of Nitinol Wire and Diamond Shape Samples

Markus Wohlschlögel¹, Florian Weidner¹, Alan R. Pelton², and Andreas Schüßler¹

(1) ADMEDES Schuessler GmbH

(2) G. Rau Inc.

Prolongation of Fatigue Life in Nitrogen Ion Implanted TiNi Shape Memory Alloy Tape

Kohei Takeda¹, Ryosuke Matsui¹, Hisaaki Tobushi¹, Shinichi Homma², and Stanislaw Kucharski³

(1) Aichi Institute of Technology

(2) Nippon Trex Co.Ltd.

(3) Institute of Fundamental Technological Research

Influence of Prestrain And Thermomechanical Treatment of Next Generation Nitinol Materials in Rotary-Bending Fatigue

Jochen Ulmer¹, Hans Nusskern², and Gerhard Sedlmayr²

(1) Euroflex GmbH

(2) G. Rau GmbH & Co. KG

Medical Applications 2

5/19/2015 • 2:55 p.m.

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Metallurgical Characterization and Three-Point Bend Testing of Rotary Nickel-Titanium Endodontic File

C.T. Wu and C.Y. Chung, City University of Hong Kong

A New Portable Device for Acute Ankle Rehabilitation with SMA-Based Actuation

Simone Pittaccio, Lorenzo Garavaglia, and Francesca Passaretti

Institute for Energetics and Interphases, National Research Council of Italy

Shape Memory Smart Clip for Blood Vessel Occlusion

Elena Prokopievna Ryklina¹, Andrey Korotitskiy¹, Irina Yurievna Khmelevskaya¹, Sergey Prokoshkin¹, Mikhail Vladimirovich Soutorine², and Artem Nikolaevich Chernov-Haraev²

(1) National University of Science and Technology

(2) Globetek 2000 PTY LTD

Production and Processing 1

5/19/2015 • 2:55 p.m.

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On the Strong Dependence of Transformation Temperatures on Alloy Composition in NiTi-Based Shape Memory Alloys

Jan Frenzel, André Wiczorek, Burkhard Maass, I. Opahle, R. Drautz, and Gunther Eggeler

Ruhr-University Bochum

Carbon Inclusions in NiTi SMAs—A Computational Thermodynamics Study

Federico Gallino, Marco Fabrizio Urbano, and Alberto Coda

SAES Getters S.p.A

In-Situ Neutron Diffraction Studies of Increasing Tension Prestrain Amplitudes of Superelastic Nitinol

Aaron Stebner, Colorado School of Mines

Exhibitor and Poster Reception

5/19/2015 • 4:30 p.m.

Partial Shape Memory Effect—A New Concept of Shape Memory Polymers

S. Abdallah-Elhirsiti¹, A. Tcharkhtchi¹, J. Fitoussi¹, M. Shirinbayan¹, S. Farzaneh¹, and Kambiz Ebrahim²

(1) Arts et Métiers ParisTech

(2) University of Bradford

Tracking Deformation Processes in Nitinol using Fast Infrared Imaging

E. Alarcon¹, S. Arbab¹, L. Saint-Sulpice¹, S. Calloch¹, L. Heller², P. Sittner², P. Sedlak², and M. Frost²

(1) ENIB, LBMS, Technopôle Brest-Iroise

(2) Academy of Sciences of the Czech Republic

Modeling a Bearing with Changeable Stiffness Based on Shape Memory Alloys for Vibration Control of Rotating Machinery

Arthur Pinheiro Barcelos and Edson Paulo da Silva, University of Brasília

Influence of Time of Cryogenic Soaking in Thermal and Mechanical Properties of an NiTi Shape Memory Alloy

Bartholmeu Ferreira da Cruz Filho, Weimar Silva Castilho, and Edson Paulo da Silva, University of Brasília

Experimental Evaluation of the Emissivity of a NiTi Alloy

Tadeu Castro da Silva and Edson Paulo da Silva, University of Brasilia

Enhancing Mechanical and Shape Memory Properties in Hyperbranched Epoxy Shape Memory Polymers

*Silvia De la Flor, David Santiago, Albert Fabregat-Sanjuan, Francesc Ferrando, and Xavier Fernández-Francos
Universitat Rovira i Virgili*

Nanoindentation Studies on Superelastic Behavior of Cu-Based Shape Memory Alloys Processed via Different Routes

T Rajesh Kumar Dora¹, Prasanna Kumar Iyengar¹, V Sampath¹, Om Prakash Modi², and Muhamed Shafeeq M²

(1) IIT Madras

(2) CSIR-Advanced Materials and Processes Research Institute

Effect of Ternary Addition on Cytotoxicity of Cu-Based Shape Memory Alloys

T Rajesh Kumar Dora, V Sampath, Mansi S, and Mukesh Doble, IIT Madras

Cyclic Behavior and Microstructure Evolution under Temperature Change of Cu-Al Based Shape Memory Ribbons

Semra Ergen¹, Fikret Yilmaz¹, Necati Basman², Ugur Kolemen¹, and Orhan Uzun²

(1) Gaziosmanpasa University

(2) Bulent Ecevit University

Thermomechanical Characterization Of NiTiCu Shape Memory Alloy Under Tension, Compression And Torsion Loading Conditions

Albert Fabregat-Sanjuan, Francesc Ferrando, and Silvia De la Flor, Universitat Rovira i Virgili

Shape Memory Effect in Aging of Ni-Ti Shape Memory Alloy Wire Bent in V-Shape at Room Temperature

Kuang-Jau Fann and Pao-Min Huang, National Chung Hsing University

Characterization of NiTi Alloys by Instrumented Nanoindentation—Experiments and Simulations

Miroslav Frost¹, A. Kruisová¹, V. Sháněl¹, Dr. Petr Sedlák¹, P. Haušild², Meni Kabla³, Doron Shilo³, and Michal Landa¹

(1) Institute of Thermomechanics

(2) Czech Technical University

(3) Israel Institute of Technology

Characterization Studies of Ni₅₀Ti_{50-x}Zr_x Shape Memory Alloys Produced by Spark Plasma Sintering

Prasanna Kumar Iyengar and V Sampath, IIT Madras

Self-Heating of Superelastic NiTi Shape Memory Alloys for Fatigue Study of Endodontic Files

Vincent Legrand^{1,2}, Luc Saint-Sulpice², Laurent Pino², S. Arbab Chirani², and Sylvain Calloch¹

(1) LBMS Ensta-Bretagne

(2) LBMS ENIB

Corrosion Resistance and Biocompatibility of a Ti-Zr-Nb-Fe Shape Memory Alloy

Yan Li, Pengfei Xue, and Henan Wang, Beihang University

Investigation of Substrate Effect on Microstructure and Mechanical Properties of NiTi-Based Thin Films

Maryam Mohri¹, Mahmoud Nili-Ahmadabadi¹, Maryam Mohri², and Horst Hahn²

(1) University of Tehran

(2) Karlsruhe Institute of Technology

Comparison of Recrystallization Kinetics and Grain Growth in Shape Memory Alloys

Marcelo Nava¹ and Emmanuel Pacheco Rocha Lima²

(1) IFBA - Instituto Federal da Bahia

(2) UnB – FGA – Universidade de Brasília – Faculdade do Gama

Thermo-Magneto-Mechanical Coupling Dynamic Behavior of Ferromagnetic Shape Memory Alloys

Oana-Zenaida Pascan^{2,1}, Yongjun He¹, Ziad Moumni^{1,2}, and Weihong Zhang²

(1) UME-MS, ENSTA-Paristech

(2) Northwestern Polytechnical University

Development of Self-Locking Bolts Using Shape Memory Alloys

Francisco Fernando Roberto Pereira and Carlos José de Araújo, Universidade Federal de Campina Grande

Blue Oxide—Next Generation Surface Finish

Andreas Schüßler¹, Gerd Siekmeyer¹, Chris Bräuner¹, Michael Quellmalz¹, Giorgio Cattaneo², and Werner Mailänder²

(1) Admedes Schuessler GmbH

(2) Acandis GmbH u. Ko. KG.

Accurate Determination of the Chemical Composition of Nickel-Titanium Binary Alloys by NIST High Performance Inductively Coupled Plasma—Optical Emission Spectroscopy Method

Xinwei Wang and Karol Putyera, Evans Analytical Group LLC.

Plenary Presentations

5/20/2015 • 8:30 a.m.

Additive Manufacturing of Nitinol Fixation Hardware for Reconstructing Mandibular Segmental Defects

A Jahadakbar¹, M Taheri Andani¹, N Shayesteh Moghaddam¹, C Haberland¹, D Dean², J Walker², H Karaca³, Skoracki R², Miller M², and M Elahinia¹

(1) The University of Toledo

(2) The Ohio State University

(3) The University of Kentucky

Corrosion and Biological Response

Christine Trepanier, NDC

Corrosion and Biological Response

5/20/2015 • 10:00 a.m.

Comparison of Biocompatibility Ion-Release Testing Methods for NiTi Medical Devices

M. Frotscher, M. Kiekbusch, R. Voegele, M. Rose, and P. Decker, Cortronik GmbH

Sequence of Steps of Nitinol Pitting in Phosphate Buffered Saline Solution

Xu Huang and Dennis W. Norwich, P.E., Memry Corporation

Effect of Silver Addition on Biocompatibility of NiTi and NiTiCu Shape Memory Alloys

Prasanna Kumar Iyengar, V Sampath, Mansi S, and Mukesh Doble, IIT Madras

In-vitro and In-vivo Investigation of Nitinol Corrosion Behavior for Pedicle Screw Constructs

Lukina Elena¹, Wagstaff Paul¹, Mason Peter¹, Gusev Dmitry², Chernyshova Yulia², Khon Alla², Kollerov Mikhail², Kazmin Arkadiy³, and Sergey Kolesov³

(1) Kingston University

(2) MATI-Russian State Technological University

(3) Central Institute of Traumatology and Orthopedics

SMA Energy Constraint in an Absorbable Implant

Jeremy E. Schaffer and Adam J. Griebel, Fort Wayne Metals Research Products Corp.

Electrochemical Characterization of Nitinol Stents after Fretting and Flow Testing

Elizabeth Trillo, Erica Macha, James Dante, and Xingguo Cheng, Southwest Research Institute

Corrosion and Mechanical Properties of Atomic Layer Deposited TiO₂ Coatings on NiTi Alloys

J. Racek¹, D. Vokoun¹, and C.C. Kei²

(1) Institute of Physics of the ASCR

(2) National Applied Research Laboratories

Corrosion Behavior of Large Nitinol Stent Structures Produced from Various Tubing Qualities

Markus Wohlschlägel, Hannah Blaich, and Andreas Schüßler

ADMEDES Schuessler GmbH

Modelling and Characterization

5/20/2015 • 10:00 a.m.

Surface Characterization of Electropolished Nitinol Devices by Auger Analysis

Siobhan Carroll¹, Jay Yang², Patrick Schnabel³, John Moskito³

(1) Boston Scientific

(2) Independent Nitinol Consultant

(3) Evans Analytical Group

A Large Elastic Strain in Fe-Pd and Fe-Pt Shape Memory Alloys

Takashi Fukuda and Tomoyuki Kakeshita, Osaka University

Testing Internal Friction and High-Frequency Response in Pseudoelastic NiTi

Lorenzo Garavaglia^{1,2}, Simone Pittaccio¹, and Carlo Ceriotti¹

(1) Institute for Energetics and Interphases - Italian National Research Council

(2) Politecnico di Milano, Milan, Italy

Benefits of an Energy-Based Material Model during Industrial Engineering of SMA

Philipp Junker and Klaus Hackl, Ruhr-University Bochum

Quasi-static and Dynamic Mechanical Behavior of Martensitic NiTi Shape Memory Alloys

Ying Qiu, Xu Nie, Ying Qiu, and Marcus L. Young, University of North Texas

Sensitivity of Nitinol Fatigue Strain on Material Inputs in Finite Element Analysis

Payman Saffari, Karthikeyan Senthilnathan, and Tom Duerig, Nitinol Devices & Components

In Situ Synchrotron X-Ray Diffraction Measurement of Simple Bending of NiTi Shape Memory Alloy Wires

Baozhuo Zhang and Marcus L. Young, University of North Texas

Plenary Presentation

5/21/2015 • 8:30 a.m.

Engineering Nitinol Thin Films For Medical Devices—A Process Review

Andreas Schüßler¹, Gerd Siekmeyer¹, Wolfgang Kannowade¹, Nils Feth¹, Rodrigo Lima de Miranda², and Eckhard Quandt³

(1) ADMEDES Schuessler GmbH

(2) Acquandas GmbH

(3) University of Kiel

Nonmedical Applications 1

5/21/2015 • 9:15 a.m.

Exomuscular Systems Based On SMA For Space Suits

Marcelo Collado¹, Cayetano Rivera¹, Naiara Escudero¹, Alvaro Villoslada², Fernando Martín², and Luis Moreno²

(1) Arquimea Ingeniería

(2) Carlos III University of Madrid

Analysis and Design of Shape Memory Alloy Morphing Radiators

Christopher L. Bertagne¹, Darren J. Hartl¹, John D. Whitcomb¹, and Rubik B. Sheth²

(1) Texas A&M University

(2) NASA Johnson Space Center

Standardized SMA Test Methods for Aerospace Applications

James H Mabe¹, Othmane Benafan², Alberto Coda³, Darren J Hartl⁴, Royi Padan⁵, Brian Van Doren⁶, and John R Webster⁷

(1) Boeing Research and Technology

(2) NASA Glenn Research Center

(3) AES Getters S.p.A

(4) Aerospace Vehicle Systems Institute

(5) Advanced Materials Dept.

(6) ATI Specialty Alloys and Components

(7) Strategic Research Centre, Rolls-Royce plc

A Superelastic Torsion Rod for Small Wing Unfolding

Royi Padan, Elad Sinai, and Yaron Ben-shmuel, Rafael Advanced Defense Systems Ltd.

High-Rate Testing of NiTi Actuator Wire Via Water Cooling

Jeremy E. Schaffer and Chase Lockwood, Fort Wayne Metals Research Products Corp.

Damping and Recentering Capabilities of Superelastic NiTi Wires—Evaluation of an In-Scale Device for Structural Control

Hugo Soul, Alejandro Yawny Centro Atómico Bariloche(CNEA)

Structure and Properties of Large Diameter Hot Rolled NiTi Bars for Seismic Applications

Weimin Yin, Frank Sczerzenie, Matt Long, Clarence Belden, R.M. Manjeri, and Rich Lafond, SAES Smart Materials

Thin Film Applications

5/21/2015 • 9:15 a.m.

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Characterization of Sputtered Micropatterned NiTi-Based Thin Film Actuators

C. Bechtold, R. Lima de Miranda, C. Zamponi, and C. Chluba, ACQUANDAS GmbH

Investigation of Microstructural Changes In Sputtered NiTi Thin Films Under Fatigue

Christiane Zamponi^{1,2}, Christoph Chluba^{1,2}, Christoph Bechtold², Rodrigo Lima de Miranda^{1,2}, and Eckhard Quandt¹

(1) Christian-Albrechts-Universität zu Kiel

(2) Acquandas GmbH

Investigation of Precipitate-Rich TiNi-Based Thin Films for Elastocaloric Cooling Devices

C. Chluba^{1,2}, R. Lima de Miranda^{1,2}, E. Quandt¹, H. Ossmer³, and M. Kohl³

(1) Christian-Albrechts-Universität zu Kiel

(2) ACQUANDAS GmbH

(3) Karlsruhe Institute of Technology (KIT)

Advances in Thin Film TiNi Shape Memory Alloys

Richard Fu¹, Eckhard Quandt², and Akira Ishida³

(1) University of the West of Scotland

(2) Christian-Albrechts-Universität zu Kiel

(3) National Institute for Materials Science

NiTi Thin Film for Endovascular Applications

Rodrigo Lima de Miranda^{1,2}, Eckhard Quandt², Giorgio Cattaneo³, Gerd Siekmeyer⁴, and Andreas Schuessler⁴

(1) Acquandas GmbH

(2) University of Kiel

(3) Acandis GmbH & Co.KG

(4) ADMEDES Schuessler GmbH

Evaluation of TiNi Thin Film Heart Valves for Transcatheter Valve Replacement

K. Loger¹, R. Lima de Miranda¹, E. Quandt¹, A. Engel², and G. Lutter²

(1) University of Kiel

(2) University Hospital of Schleswig-Holstein

Nitinol Micro Actuators from Sputter Deposition for Local Drug Delivery

Gerd Siekmeyer¹, Wolfgang Kannowade¹, Andreas Schüßler¹, Rodrigo Lima de Miranda^{2,3}, and Eckhard Quandt³

(1) ADMEDES Schuessler GmbH

(2) Acquandas GmbH

(3) University of Kiel

Nonmedical Applications 2

5/21/2015 • 11:55 a.m.

Nanocrystalline NiTi Shape Memory Thin Wires for Micro Actuators

Alberto Coda, Andrea Cadelli, Luca Fumagalli, and Giorgio Vergani, SAES Getters S.p.A, Lainate (MI)

Elastocaloric Cooling Device—Materials and Modeling

Jaka Tušek, Kurt Engelbrecht, Nini Pryds, and Lars P. Mikkelsen, Technical University of Denmark (DTU)

Caloric Effects in Shape Memory Alloys—Optimizing NiTi for Solid State Refrigeration

A. Wiczorek, J. Frenzel, and G. Eggeler, Ruhr-Universität Bochum

Production and Processing 2

5/21/2015 • 1:35 p.m.

Effects of Room Temperature Aging on Hydrogen-Charged Nitinol

Daniel Madamba and Tom Duerig, Nitinol Devices and Components

Two-Way Shape Memory Effect Developed by Repetitive Corrugation and Straightening by Rolling (RCSR) Technique

Alireza Razzaghi, Mahmoud Nili-Ahmadabadi, and Hamed Shahmir, University of Tehran

The Effects of Heat Treatment on the Properties of Shape Memory Nitinol Wires

L. Rolsen, D. Plumley, W. Buchan, and J.E. Schaffer, Fort Wayne Metals Research Products Corp.

The Effect of Alloy Formulation, Cold Work, and Inclusion Content on Microvoid Formation in NiTi Alloy Fine Wires

Frank Sczerzenie¹, R. M. Manjeri¹, Clarence Belden¹, Rich Lafond¹, and Grant Brewer²

(1) SAES Smart Materials

(2) SAES Memry

Ternary Alloys and Polymers

5/21/2015 • 2:15 p.m.

Transformation and Deformation Characterization of NiTiHf and NiTiAu High-Temperature Shape Memory Alloys

Lee Casalena¹, Daniel Coughlin², Fan Yang¹, Xiang Chen¹, Harshad Paranjape¹, Yipeng Gao¹, Matthew Bowers¹, Ronald Noebe³, Glen Bigelow³, Darrell Gaydos³, Santo Padula³, Yunzhi Wang¹, Peter Anderson¹, and Michael Mills¹

(1) The Ohio State University

(2) Los Alamos National Laboratory

(3) NASA Glenn Research Center

Materials Characterization of NiTi and CuAlMn Shape Memory Alloy Bars under Dynamic Bending

Haoyu Huang, Wenjun Xie, and Wen-Shao Chang, University of Bath

Effects of Grain Size and Coaddition on Transformation Temperatures of Ti-Ni-Zr High-Temperature Shape-Memory Alloys

A. Ishida, National Institute for Materials Science

Neutron Diffraction of Co-Ni-Ga High-Temperature Shape-Memory Single Crystals

Peter M. Kadletz¹, Philipp Krooss², Christoph Somsen³, Thomas Niendorf⁴, Yuri I. Chumlyakov⁴, Wolfgang W. Schmahl¹, and Hans J. Maier⁵

(1) Ludwig-Maximilians-Universitaet

(2) Institut für Werkstofftechnik

(3) Ruhr University of Bochum

(4) Tomsk State University

(5) Leibniz University of Hannover

Fatigue 2

5/22/2015 • 9:15 a.m.

The Effect of Crimp Strain on the Fatigue Performance of Nitinol

Paul Briant¹, Brad James¹, Sarah Easley¹, Shane Kennett¹, Jeremy Schaffer², and Lawrence Kay²

(1) Exponent, Inc.

(2) Fort Wayne Metals Research Products Corporation

The Effect of Maximum Incremental Forming Strain on the Fatigue Properties of Nitinol Wire

D.W. Norwich, M. Ehrlenspiel, D. Mandanici, K. Duran, and X. Huang, Memry Corporation

High Compressive Prestrain Reduces the Bending Fatigue Life of Nitinol Wire

Alan R. Pelton¹, Shikha Gupta², Jason Weaver², Xiao-Yan Gong³, and Srinidhi Nagaraja²

(1) G.RAU Inc.

(2) Food and Drug Administration

(3) Medical Implant Mechanics LLC

Fatigue Properties of Metastable Beta Ti-22Nb-6Zr (at%) Alloy for Load-Bearing Biomedical Applications

Vadim Sheremetyev¹, Sergey Prokoshkin¹, Sergey Dubinskiy¹, Vladimir Brailovski², and Karine Inaekyan²

(1) National University of Science and Technology "MISIS"

(2) Ecole de technologie superieure

Microstructure Evolution and Superelastic Fatigue of NiTi

Petr Šittner, Pavel Sedmák, Jan Pilch, Ondřej Tyc, and Luděk Heller, Institute of Physics of the ASCR

Improvements to the Fatigue Life of Shape Memory Alloys Using Partial Transformation Cycles Based on Energy Output Per Cycle

F. Sluis, H.E.N. Bersee, R.C. Alderliesten, and R. Benedictus, Delft University of Technology