COMAT 2022

16th International Conference on **Martensitic Transformation**

March 13-18, 2022 Virtual, Korea





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Organized by





Engineering Research Center for Integrated Mechatronics Materials and Components















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WELCOME MESSAGE

Dear Colleagues and Friends,

On behalf of the ICOMAT 2022 organizing committee, I would like to welcome all the participants to the first ever virtual conference of the International Conference on Martensitic Transformation!

When we organized ICOMAT 2022, we expected to greet every participant face-toface and hoped to introduce the rich Korean culture that spans over 4000 years. The ICOMAT 2022 conference, however, had to be postponed from July of 2019 to March of 2022 due to the COVID-19 pandemic with the hope of offering a conventional in-person type conference. Nevertheless, the current COVID-19 situation does not allow our hope to be realized. As the safety and well-being of all our participants is our first priority, we are finally gathered here today virtually.

First of all, I'm pleased to meet you online and would like to thank all of our participants for your continued patience and support along the way.

We have arranged a wealth of technical programs with 12 topics that feature a wide selection of experts in modern as well as traditional martensitic transformation. We have tried to make the virtual platform of ICOMAT 2022 as user friendly as possible. We will keep the virtual platform open during the conference, so that you can watch all the prerecorded presentations, view the e-Posters You can interact with the speakers and colleagues as much as you would in-person using the chat discussion function. There will also be live sessions for 4 days and we hope that all of you will find ICOMAT 2022 enjoyable and rewarding.

Many people have devoted their time and efforts to the preparation of this conference. I would like to acknowledge the local committee members for their enormous efforts in making such dynamic and informative content under an exceptionally difficult situation. We are grateful again to all of you for joining us and hope you enjoy the ICOMAT 2022 virtual conference from your office or home!



Tae Hyun Nam Gyeongsang National University General Chair, ICOMAT 2022

Jackyim



Sung domkrin **Sung-Joon Kim** POSTECH

General Chair, ICOMAT 2022

1st **ICOMAT 1976** Kobe, Japan

2nd **ICOMAT 1977** Kiev, Ukraine

3rd **ICOMAT 1979** Boston, USA

4th **ICOMAT 1982** Leuven, Belgium

5th **ICOMAT 1986** Nara, Japan

6th **ICOMAT 1989** Sydney, Australia

7th **ICOMAT 1992** Monterey, USA

8th **ICOMAT 1995** Lausanne, Switzerland



Although our 16th Annual Conference will look and feel a little different, the tradition of connecting our community through a virtual platform promises to be an exciting experience. We welcome you to join us in this new endeavor, a Virtual ICOMAT 2022 Conference.

TITLE	16th International Conference on Martensitic Transformation (ICOMAT 2022)
DATE	March 13 (Sun)–18 (Fri), 2022
PLACE	Virtual, Korea
HOSTED BY	The Korean Institute of Metals and Materials
ORGANIZED BY	 Innovative Process Design Center for Strategic Structural Materials Engineering Research Center for Integrated Mechatronics Materials and Components Education and Research Division for Futuristic Human-centric Materials, Yonsei University Materials Education/Research Division for Creative Global Leaders, Seoul National University Human Resources and Research Platform Program for Leading Materials Innovation, Changwon National University Research Institute for Green Energy Convergence Technology
SUPPORTED BY	The Korean Federation of Science and Technology Societies Korea Tourism Organization
PROGRAMS	Opening Ceremony, Plenary Talk, Technical Session (Invited, Oral & Poster) Live Discussion Session, Award, Events
WEBSITE	https://www.icomat2022.org
HIGHLIGHTS	The 1st Virtual conference 4 plenary, 64 invited, 138 oral and 38 poster presentations from 28 countries Exciting discussion sessions with valuable thoughts/opinions/experiences of our participants

9th **ICOMAT 1998**

Bariloche, Argentina

10th

ICOMAT 2002 Helsinki, Finland

11th **ICOMAT 2005** Shanghai, China

12th **ICOMAT 2008** Santa Fe, USA

13th **ICOMAT 2011** Osaka, Japan

14th

ICOMAT 2014 Bilbao, Spain

15th **ICOMAT 2017** Chicago, USA

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07

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Colorado School of Mines, USA

Kyushu University, Japan

M. Nishida

K. Otsuka

National Institute for Materials Science, Japan

KEY SPEAKERS

Plenary Speaker



Othmane Benafan

National Aeronautics and Space Administration (NASA), USA

"15 Years of NASA's Shape Memory Alloy Development for Aerospace: Slow Emergence with a Promising Outlook"



Dirk Ponge

Max-Planck-Institut für Eisenforschung, Germany

"Segregation Engineering Enables Site Specific Martensite-To-Austenite Reversion at Lattice Defects"



Xuejun Jin

Shanghai Jiao Tong University, China

"Martensitic Transformation and Elasto-caloric Effect "in Ti-Ni Based Alloys"



Ryosuke Kainuma

Tohoku University, Japan

"Abnormal Grain Growth and Superelasticity in CuMnAl and FeMnAlNi Shape Memory Alloys"

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Invited Speaker

01 Fundamentals of Martensitic Transformation



Cyril Cayron

Swiss Federal Institute of Technology in Lausanne. Switzerland

The Transformation
Matrices and The
Correspondence Theory



Eunsoo Choi

Hongik University, Korea

Crimped Short
Reinforcing Fibers using
Cold Drawn NiTi SMA
Wires

09



Gunther Eggeler

Ruhr-Universität Bochum, Germany

Shape Memory Alloy Composition, Gibbs Free Energies and Martensite Start Temperatures on the Importance of Enthalpy and Entropy



Valery Levitas

Iowa State University, USA

Phase Field Approaches to Interaction between Martensitic Phase Transformations and Dislocation Evolution

01 Fundamentals of Martensitic Transformation



Natalia Resnina

Saint-Petersburg State University, Russia

Damage of the
Martensite Interfaces as
the Mechanism of the
Martensite Stabilization
Effect in NiTi Alloys



Qingping Sun

Hong Kong University of Science and Technology, China

Super-high Fatigue Life of NiTi SMA at Marco - and Microscales

02 Theoretical Approaches to Martensitic Transformation



Mohsen Asle Zaeem

Colorado School of Mines, USA

Multiscale Modeling Study of Deformation Mechanisms and Flaw Tolerance of Shape Memory Ceramics



Shi-Hoon Choi

Sunchon National University, Korea

Development of Research
Methodologies for
Comprehending the
Effect of Martensite on
Deformation and Fracture
Behavior of Multi-Phase
Steels

02 Theoretical Approaches to Martensitic Transformation



Pedro Rivera-Diaz-del-Castillo

Lancaster University, United Kingdom

Predicting Martensitic Transformation in Titanium Alloys



Avadh Saxena

Los Alamos National Laboratory, USA

Flexocaloric Effects in Ferroic Materials: Thermodynamics of Bending

03 Martensitic Transformation in Steels



Matthias Bönisch

KU Leuven, Belgium

Temperature-dependent
Tension-compression
Asymmetry of TRIP
Stainless Steel Studied by
in-situ High-energy XRD



Yoon Suk Choi

Pusan National University, Korea

Microstructures and Defects of Medium-Carbon Steel Layers Additively Deposited on Gray Cast Iron



Mingxin Huang

he University of Hong Kong, Hong Kong

Revisit the TRIP Effect on Work Hardening Behavior of Steel at High Strain Rate

03 Martensitic Transformation in Steels



Tae-Ho Lee

Korea Institute of Materials Science, Korea

Screw Dislocation Driven Martensitic Nucleation



Young-Kook Lee

Yonsei University, Korea

Stasis Mechanism of γ → ε Martensitic Transformation in Fe-17Mn Alloy



Goro Miyamoto

Tohoku University, Japan

Comparison of Driving Force Necessary for Bainite and Martensite Transformations in Steels



Nobuo Nakada

Tokyo Institute of Technology, Japan

Development of Internal Stress of Plate Martensite via Fcc-hcp Martensitic Transformation in Metastable Austenitic Stainless Steels



Takahito Ohmura

National Institute for Materials Science, Japan

Nano-Mechanical
Characterization in
Constituent Phases of
Steels for Interpretation of
Macroscopic Deformation
Behavior

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Akinobu Shibata

National Institute for Materials Science, Japan

Microstructural and Crystallographic Studies on Hydrogen-related Fracture in Martensitic Steels

03 Martensitic Transformation in Steels



Toshihiro Tsuchiyama

Kyushu University, Japan

Evaluation of Dislocation Density and Dislocation Distribution in Lath Martensite



Kaneaki Tsuzaki

Kyushu University, Japan

A Mystery of Hydrogen
Effects in Steel:
Suppression and
Promotion of Thermallyand Deformation-induced
Epsilon Martensitic
Transformations

04 Novel Shape Memory Alloys



Daoyong Cong

University of Science and Technology Beijing, China

Exploration of Novel Shape Memory Alloys for Elastocaloric Refrigeration



Do Hyang Kim

Yonsei University, Korea

Ti-Ni Based Shape Memory Alloy Exhibiting High Glass Forming Ability

04 Novel Shape Memory Alloys



Xianglong Meng

Harbin Institute of Technology, China

Martensite Microstructure and Shape Memory Effect of a Ti-16Nb High Temperature Shape Memory Alloy Subjected to Thermomechanical Treatment



Gregory B. Olson

Northwestern University, USA

Design of Fatigue-Resistant NiTi-based Shape Memory Alloys

14



Koichi Tsuchiya

National Institute for Materials Science, Japan

FCC-HCP Martensitic Transformation and Shape Memory Effect in High-Entropy Alloys



Kaiyuan Yu

China University of Petroleum-Beijing, China

Temperature-dependence of Critical Stresses in Nanocrystalline NiTi Alloys

05 Magnetic Shape Memory Alloys



Markus Chmielus

University of Pittsburgh, USA

Beam- and Non-Beam-based Additive Manufacturing and Post-Processing of Magnetocaloric and Magnetic-Shape-Memory Materials



Markus Ernst Gruner

University of Duisburg-Essen, Germany

A First-Principles
Perspective on the
Interplay of Magnetism
and Microstructure
in Ni-Mn-based Heusler
Alloys



Oleg Heczko

Institute of Physics of the Czech Academy of Sciences, Czech

Role of Antiphase Boundaries in Martensitic Transformation and Magnetic Shape Memory Effect



Antoni Planes

University of Barcelona, Spain

Ferromagnetic Heusler Shape-Memory Alloys: Materials for Energy Applications



Kari Ullakko

Lappeenranta-Lahti University of Technology LUT, Finland

MicroMagnetomechnanical
Systems (MAMS)
Represent the
3rd Generation
Electromechanical
Devices

06 Martensitic Transformations in Non-ferrous Materials



Taekyung Lee

Pusan National University, Korea

Martensitic
Transformation in
Ti-13Nb-13Zr Alloy
for Surgical Implant
Applications



Xiaohua Min

Dalian University of Technology, China

Metastable Phase Evolution and Deformation Mode Transition in β-type Titanium Alloys

16



Dongyi Seo

National Research Council Canada, Canada

Microstructures and High Cycle Fatigue Properties of Ti-Al-Fe-Si Based Alloys



Petr Sittner

Institute of Physics of the Czech Academy of Sciences, Czech

Transformation –
Plasticity Coupling in
Thermomechanical
Loading of NiTi

07 Martensitic Transformations in Nano-structured Materials



Manfred Kohl

Karlsruhe Institute of Technology, Germany

Shape Memory Nanoactuators for Photonics Applications



Sergey Prokoshkin

National University of Science and Technology "MISiS", Russia

Search for Critical Austenite Grain Size Limiting Stress-Induced Transformation in Titanium Nickelide



Jose M. San Juan

Universidad del País Vasco, Spain

Overview on Size Effects at Nanoscale in Cu-based Shape Memory Alloys: d Universal Scaling Law

08 Novel Characterization of Martensite



Xiao Fei

Shanghai Jiao Tong University, China

Inverse Elastocaloric Effect in the Ti-Ni Shape Memory Alloy



Yoon-Uk Heo

Pohang University of Science and Technology, Korea

Electron Microscopic Study of Stressassisted Martensitic Transformation in a Medium Manganese Steel

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Hideki Hosoda

Tokyo Institute of Technology, Japan

New Evaluation Methods for Martensitic Transformation Behavior of Shape Memory Alloys

08 Novel Characterization of Martensite



Shigekazu Morito

Shimane University, Japan

Crystallographic Features in Three Dimensional Microstructures of Fe-C-Mn Lath Martensite



Minoru Nishida

Kyushu University, Japan

Recent Microstructure Characterizations in Ti-Ni Based Shape Memory Alloys



Dominique (Nick) Schryvers

University of Antwerp, Belgium

In-situ TEM Stressinduced Martensitic Transformation



Cem Tasan

Massachusetts Institute of Technology, USA

How Human Hair Deforms Ferrous Martensite: An In-Situ Study



Martin Franz-Xaver Wagner

Technische Universität Chemnitz, Germany

Analysis of Dislocationtwin Interaction in NiTi Martensites during Stress Relaxation

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Ashley Bucsek

University of Michigan, USA

Probing Martensitic Phase
Transformations and
Twinning Across Length
Scales Using 3D X-Ray
Microscopy

09 Advanced Processing Techniques



Jae-Keun Hong

Korea Institute of Materials Science, Korea

Multiscale Microstructures in Titanium Alloys Manufactured by Additive Manufacturing



Haiwen Luo

University of Science and Technology Beijing, China

Substantial Strengthening of Medium Mn Steel due to the Reverse Martensite-like Austenitic Transformation during Ultrafast Heating

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Chan Hee Park

Korea Institute of Materials Science, Korea

ening An Effective Approach to
eel Produce a Nanocrystalline
se Ni–Ti Shape Memory Alloy
enitic without Severe Plastic
ring Deformation



Aaron Stebner

Georgia Institute of Technology, USA

Additive Manufacturing of NiTi-based Shape Memory Alloys

10 Engineering Applications and Devices



Huilong Hou

University of Maryland, USA

Fatigue-Resistant Highperformance Elastocaloric Materials Made by Additive Manufacturing



HyunWoo Jin

ExxonMobil Research & Engineering, USA

Martensite in Oil and Gas Industry: State-of-theart Applications & Future Opportunities



Takahiro Sawaguchi

National Institute for Materials Science, Japan

Seismic Response Control of Buildings with Fe– high Mn Alloys with Dual γ/ε Phase Deformation Microstructure



Dong-Woo Suh

Pohang University of Science and Technology, Korea

Microstructure and Mechanical Properties of Medium Carbon Martensite-bainite Complex Phase Steels



Ichiro Takeuchi

University of Maryland, USA

Development of Compression-based Elastocaloric Cooling Systems Based on Superelastic Shape Memory Alloys

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12 Martensite for Emerging Materials



Yinong Liu

The University of Western Australia, Australia

NiTi as a Means to Induce Ultra-Large Elastic Strains in Other Materials



Frédéric Prima

ChimieParisTech (National Chemical Engineering Institute in Paris), France

New Strain-Transformable
Titanium Alloys
Displaying Combined TRIP
and TWIP Effects: From
Design Approaches to
Deformation Mechanisms

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Eun Soo Park

Osaka University, Japan

Development of
Fatique-resistant HighPerformance Elastocaloric
TiCu-based Superelastic
Alloys



Yuan Wu

University of Science and Technology Beijing, China

Reinforcement of HEAs via Stress-induced Phase Transformation

PROGRAM AT A GLANCE

Program Overview

March 13 (Sun)	March 14 (Mon)	March 15 (Tue)	March 16 (Wed)	March 17 (Thu)	March 18 (Fri)
Virtual Site Open	Discussion Session ((p))	Opening Ceremony ((a))	Discussion Session ((p))	Discussion Session ((p))	Discussion Session ((p))
Presentation VODs Opened					

- OT All Presentation VODs will be open on ICOMAT 2022 virtual website from March 10 to 18.
- **Q2** Please note that no specific schedule will be set for presentations.
- 13 A live discussion session will be opened via zoom each day at a specific time slot. Thus, everyone (including presenter, audience, and moderator) will virtually meet through daily zoom discussion session on different timetables.

How to Access the Virtual Page



- Only participants who have completed registration can access the virtual website with the registered login
- 02 Click "Go to ICOMAT 2022 Virtual Website" on the main page of website (www.icomat2022.org) to access the
- 03 Log in using ICOMAT 2022 official website ID and password.
- Of Virtual website and entire presentation will be made available from 18:00 March 10 to 24:00 on March 18 (Korea Standard Time/ GMT+9)

Opening Ceremony



March 15 (Tue) / 16:00-16:50 / Korea Standard Time

Host



Hyokyung Sung Gyeongsang National University

Opening Address



Sung-Joon Kim General Chair, ICOMAT 2022

Welcome **Address**



Hyuck Mo Lee President of the Korean Institute of Metals and Materials

Congratulatory Addresses



G.B. Olson General Chair, ICOMAT 2017



J. San Juan General Chair, ICOMAT 2014

Messages from **Plenary Speakers**



Othmane Benafan NASA, USA



Ryosuke Kainuma Tohoku University, Japan



Dirk Ponge Max-Planck-Institut für Eisenforschung, Germany



Xuejun Jin Shanghai Jiao Tong University,

Introduction of **Virtual Website**



Taekyung Lee Pusan National University

ICOMAT 2022 Report Closing Ceremony



Tae Hyun Nam General Chair, ICOMAT 2022

INTRODUCING OUR VIRTUAL WEBSITE

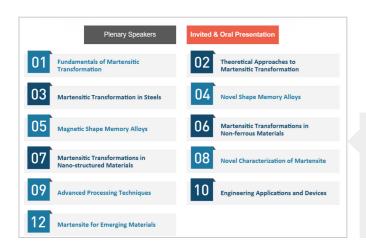
Welcome page of ICOMAT 2022-Virtual!

Our virtual website will help you have the best experience at ICOMAT 2022.



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Upon accessing the virtual website, you will see a menu bar that displays all the navigation needs for the conference. You will get to see the highlights of ICOMAT 2022 for each day.



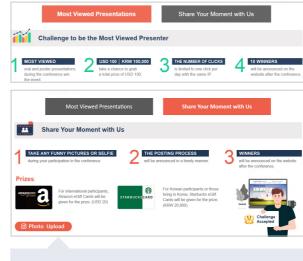
Invited and oral presentations are listed up. Watch recent research from researchers and engineers around the world to enrich your knowledge and share ideas in the field of Martensitic Transformation!



Opening Ceremony will be live streamed through YouTube Video on the left side.

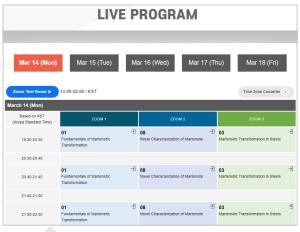


Check the list of the 10 most viewed presentations based on the current hit status



Share your moments with ICOMAT 2022! Upload a picture while participating in the conference.

Presentations will be shown as it is. Leave a comment or send e-mail to have a lively discussion. You can ask and answer questions through comments and have the option to add presentation to your favorites.



View entire live programs of ICOMAT 2022 at a glance. Click on each session to see the list of presentations and join the sessions live via Zoom linked on the page.



Find out our sponsors! Click on each sponsor banner to find more information and watch promotional videos.

AWARD & EVENT

ICOMAT 2022 Awards Open to All Passionate Scientists



ORAL AWARD

10 Winners

A prize worth USD 200 | KRW 200,000



POSTER AWARD

10 Winners

A prize worth USD 100 | KRW 100,000



- All orals and posters will be eligible for award nomination.
- Session chairs and program committee will select best presentations.
- •The winners will be announced on the website after the conference.
- A certificate will be delivered by airmail and cash prize will be wire transfer.

Be the Winners of the Most "Viewed" Event



- Most viewed presentations during the conference win the event.
- •The number of clicks is limited to one per day with the same IP & ID.
- The winner will be announced on the website after the conference.
- USD 100 | KRW 100,000 for 10 winners

Share Your Moment and Create Memories



- participants who upload a selfie to the virtual event board (while participating in the virtual sessions)
- USD 20 | KRW 20,000 for participants

COMAT 2022

16th International Conference on Martensitic Transformation

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LIVE DISCUSSION SESSION

Regardless of the field of martensitic transformation, we hope researchers can discuss opportunities for the present and future!

- All presentation VODs will be opened on our virtual website from 3 days prior to the conference date.
- A live discussion session will be opened via zoom each day at a specific time slot.
 Thus, everyone (including presenter, audience, and chair) will virtually meet through daily zoom discussion session on different timetables.

HOW DOES THE LIVE DISCUSSION GO?

- Session chair briefly introduces the presenter.
- The presenter presents a 2 or 3-minute summary of presentation. (2-3 slides are recommended to be prepared.)
- Q&A follows after the presentation.
- The presenters and audience will have a discussion.

HOW TO JOIN A LIVE DISCUSSION SESSION?

A presenter can access each live discussion session room via the virtual website of ICOMAT 2022. (Only paid registrants are allowed to access the virtual website.)

OTHER IMPORTANT NOTICES!

- Please join the session 15 minutes before it starts.
- Be careful not to make noise when you join a session.
- Recommend using headset to deliver clearly. (Laptop audio significantly reduces the clarity of voice)

- The ZOOM TEST ROOM opens from 1 p.m. to 7:30 p.m. on March 14-18 (KST).
- All times indicated are in Korea Standard Time UTC+09:00 hours.

SESSION TIMETABLE

7002						
	March 14 (Mon)					
	ZOOM 1	ZOOM 2	ZOOM 3			
19:30-20:30	01 Fundamentals of Martensitic Transformation p. 31	08 Novel Characterization of Martensite p. 33	03 Martensitic Transformation in Steels p. 36			
20:30-20:40						
20:40-21:40	O1 Fundamentals of Martensitic Transformation p. 32	08 Novel Characterization of Martensite p. 34	03 Martensitic Transformation in Steels p. 37			
21:40-21:50						
21:50-22:50	O1 Fundamentals of Martensitic Transformation p. 33	08 Novel Characterization of Martensite p. 35	03 Martensitic Transformation in Steels p. 38			

	March 15 (Tue)
16:00-16:50	Opening Ceremony

	March 16 (Wed)					
	Z00M 1	Z00M 2	ZOOM 3			
19:30-20:30	02 Theoretical Approaches to Martensitic Transformation p. 40	09 Advanced Processing Techniques p. 42	03 Martensitic Transformation in Steel p. 43			
20:30-20:40						
20:40-21:40	02 Theoretical Approaches to Martensitic Transformation p. 40	09 Advanced Processing Techniques p. 42	03 Martensitic Transformation in Steel p. 44			
21:40-21:50						
21:50-22:50	02 Theoretical Approaches to Martensitic Transformation p. 41		03 Martensitic Transformation in Steel p. 45			

	March 17 (Thu)					
	ZOOM 1	ZOOM 2	ZOOM 3			
19:30-20:30	05 Magnetic Shape Memory Alloys p. 47	04 Novel Shape Memory Alloys p. 49	06 Martensitic Transformations in Non-ferrous Materials p. 52			
20:30-20:40						
20:40-21:40	05 Magnetic Shape Memory Alloys p. 47	04 Novel Shape Memory Alloys p. 50	06 Martensitic Transformations in Non-ferrous Materials p. 52			
21:40-21:50						
21:50-22:50	05 Magnetic Shape Memory Alloys p. 48	04 Novel Shape Memory Alloys p. 51	06 Martensitic Transformations in Non-ferrous Materials p. 53			

	March 18 (Fri)					
	Z00M 1	ZOOM 2	ZOOM 3			
19:30-20:30			12 Martensite for Emerging Materials p. 59			
20:30-20:40						
20:40-21:40	10 Engineering Applications and Devices p. 56	07 Martensitic Transformation in Nano-structured Materials p. 58	06 Martensitic Transformations in Non-ferrous Materials p. 60			
21:40-21:50						
21:50-22:50	10 Engineering Applications and Devices p. 57	07 Martensitic Transformation in Nano-structured Materials p. 58	06 Martensitic Transformations in Non-ferrous Materials p. 60			
22:50-23:00		Closing Remarks				



LIVE DISCUSSION SESSION LIST

March 14 (Monday)

01 Fundamentals of Martensitic Transformation

¹ 19:30-20:30, March 14 (Monday) / KST

ZOOM 1

Chair(s) Hyokyung Sung (Gyeongsang National University, Korea)

Qingping Sun (Hong Kong University of Science and Technology, China)

1-0212 On the Influence of Enthalpy and Entropy on the Martensite Start Temperature in NiTi-Based SMAs

INVITED <u>Gunther Eggeler</u>, Jan Frenzel, David Piorunek, Nicole Stötzel *Ruhr-Universität Bochum, Germany*

1-0563 Damage of the Martensite Interfaces as the Mechanism of the Martensite Stabilization Effect

INVITED in NiTi Allov

Natalia Resnina¹, Sergey Belyaev¹, Alexandra Ivanova¹, Timur Rakhimov¹, Elizaveta Iaparova¹, Irina Ponikarova¹, Vladimir Andreev²

¹Saint-Petersburg State University, Russia, ²MATEK-SMA Ltd., Russia

1-1616 Strain Field Analysis of Lüders-type Deformation in NiTi

Bashir Samsam Shariat, <u>Yingchao Li</u>, Hong Yang, Yinong Liu *The University of Western Australia, Australia*

1-0698 Martensitic Microstructure in Epitaxial NiTi Thin Films

Klara Lünser^{1,2}, Stefan Schwabe^{1,3}, Kornelius Nielsch^{1,3}, Sebastian Fähler²

¹Leibniz Institute for Solid State and Materials Research Dresden, Germany, ²Helmholtz-Zentrum Dresden-Rossendorf, Germany, ³Technische Universität Dresden, Germany

1-0490 On the Strain Compatibility at the Interface between the Austenite and Stress Induced Martensite in NiTi

<u>Ludek Heller</u>, Petr Sittner, Orsolya Molnarova, Jan Duchon *Institute of Physics of the Czech Academy of Sciences, Czech Republic*

1-0985 Adaptive Phase Martensite or Adaptive Variant Formation in Shape Memory Alloys?

Robert Chulist¹, Anna Wojcik¹, Alexei Sozinov², Marek Faryna¹, Norbert Schell³, Werner Skrotzki⁴, Tomasz Tokarski⁵, Wojciech Maziarz¹

¹Institute of Metallurgy and Materials Science, Polish Academy of Sciences, Poland, ²Lappeenranta-Lahti University of Technology, Finland, ³Helmholtz-Zentrum Geesthacht, Germany, ⁴Technische Universität Dresden, Germany, ⁵AGH University of Science and Technology, Poland

01 Fundamentals of Martensitic Transformation

20:40-21:40, March 14 (Monday) / KST

ZOOM 1

Chair(s) Byung Hak Choe (Gangneung-Wonju National University, Korea)
Cyril Cayron (École Polytechnique Fédérale de Lausanne, Switzerland)

1-0997 Super-high Fatigue Life of NiTi SMA at Marco- and Microscales

INVITED Qingping Sun¹, Peng Hua¹, Kangjie Chu¹, Dingshan Liang^{1,2}

¹The Hong Kong University of Science and Technology, China, ²Southern University of Science and Technology, China

1-0263 Mechanical Properties of Cold-drawn SMA Wires

INVITED Eunsoo Choi, Alireza Ostadrahimi

Hongik University, Korea

1-1610 Thermomechanical Behavior of Gum Metal under Tension

Elżbieta Alicja Pieczyska¹, Karol Golasiński^{1, 2}, Michał Maj¹, Shigeru Kuramoto³

¹Polish Academy of Sciences, Poland, ²University of Tsukuba, Japan, ³Ibaraki University, Japan

1-1696 Compatibility Condition at Triple Junction of Martensite and Unusual Microstructure in TiNiCu Alloy

Tomonari Inamura¹, Francesco Della Porta², Akira Heima¹, Yuri Shinohara¹, Minoru Nishida³

¹Tokyo Institute of Technology, Japan, ²Max-Planck-Institute for Mathematics in the Sciences, Germany, ³Kyushu University, Japan

1-1600 Metastable Phase Diagram on Heating in Quenched Ti-Nb High Temperature Shape Memory Alloys

Jian Zhang^{1, 2}, Yanjie Li², Wei Li²

¹Jiangnan University, China, ²Xi'an Jiaotong University, China

1-1815 The Effect of Severe Plastic Deformation on the Microstructure and Martensitic Transformation of Binary TiNi - based Alloys

Angelina Gusarenko¹, Aleksander Lotkov¹, Victor Grishkov¹, Yuri Mironov¹, Konstantin Krukovskii¹,

Natalia Girsova¹, Dorzhima Zhapova¹, Oleg Kashin¹, Vladimir Kopylov²

¹Institute of Strength Physics and Materials Science of Siberian Branch Russian Academy of Sciences, Russia,

²Physical - Technical Institute of the National Academy of Sciences of Belarus, Belaru

1-1203 Common Characteristics of Omega and Martensitic Transformation

Byung Hak Choe¹, Gil Jae Lee²

¹Gangneung-Wonju National University, Korea, ²Korea East-West Power, Korea

1-0558 Kinetic Arrest of B2-R and R-B19' Martensitic Transformations in Ti-(50-x)Ni-xFe Shape Memory Alloys

Mitsuharu Todai¹, Takashi Fukuda², Tomoyuki Kakeshita³

¹National Institute of Technology, Niihama College, Japan, ²Osaka University, Japan, ³Fukui Institute of Technology, Japan

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01 Fundamentals of Martensitic Transformation

21:50-22:50, March 14 (Monday) / KST

ZOOM 1

Chair(s) Jin-Yoo Suh (Korea Institute of Science and Technology, Korea)
Natalia Resnina (Saint-Petersburg State University, Russia)

1-0136 The Correspondence Theory of Martensitic Transformations

INVITED Cvri

Cyril Cayron

Swiss Federal Institute of Technology Lausanne, Switzerland

1-1805 Plastic Strain-Induced Phase Transformations under High Pressure: Four-Scale Theory, Experiments,

INVITED and Phenomena

Valery Levitas

Iowa State University, USA

1-1493 Strain Glass Alloy as a Novel Elastic Energy Storage Material

NVITED Xiaobing Ren^{1, 2}, Yuanchao Ji³, Dong Wang³

 1 National Institute for Materials Science, Japan, 2 Center for Functional Materials, Japan, 3 Xi'an Jiaotong University, China

1-1175 Tetragonality of Thermally Induced Martensite in the Fe-Mn-Al-Ni System

Peter Fischer, Alexander Walnsch, Stefan Neumann, Mario J. Kriegel, David Rafaja, <u>Andreas Leineweber</u> *Technische Universität Bergakademie Freiberg, Germany*

1-1650 An Electrical Characterization of Stress-induced Martensitic Transformation in Fe-28Mn-6Si-5Cr Shape Memory Alloy during Whole Process after Compression

<u>Qian Sun</u>, Takeshi Iwamoto Hiroshima University, Japan

1-1702 Martensite Formation in Nitrogen-stabilized 17%Cr Austenite during Cooling and (re)Heating

<u>Basit Ali</u>, Matteo Villa, Marcel A. J. Somers Technical University of Denmark, Denmark

1-0844 Crystal Structure Analysis of Au₂CuAl Martensite Phase

Yuki Matsuoka¹, Mayuko Uchida¹, Akira Umise^{2,3}, Hideki Hosoda²

¹Nara Women's University, Japan, ²Tokyo Institute of Technology, Japan, ³Tokyo Medical and Dental University, Japan

08 Novel Characterization of Martensite

19:30-20:30, March 14 (Monday) / KST

ZOOM 2

Chair(s) Yoon-Uk Heo (Pohang University of Science and Technology, Korea)
Dominique (Nick) Schryvers (University of Antwerp, Belgium)

8-0285 Inverse Elastocaloric Effect in the Ti-Ni Shape Memory Alloy

NVITED

<u>Xiao Fei</u>^{1, 2}, Takashi Fukuda², Xuejun Jin¹

¹Shanghai Jiao Tong University, China, ²Osaka University, Japan

INVITED	<u>Saeid Pourbabak</u> ^{1, 2} , Vahid Samaee ¹ , Andrey Orekhov ¹ , Jan Van Humbeeck ² , Bert Verlinden ² , Dominique (Nick) Schryvers ¹
	¹ University of Antwerp, Belgium, ² Katholieke Universiteit Leuven, Belgium
8-1031	Analysis of Dislocation-twin Interaction in NiTi Martensites during Stress Relaxation
INVITED	Martin Franz-Xaver Wagner ¹ , Cagatay Elibol ² ¹ Technische Universität Chemnitz, Germany, ² Turkish-German Univerisity, Turkey
8-0121	Development and Applications of Differential Interference Microscopy for Characterization
	of Martensitic Transformation
	Zhuohui Zeng¹, Shengwang Du², Xian Chen¹
	¹ Hong Kong University of Science and Technology, Hong Kong, ² University of Texas at Dallas, USA
8-0803	Ultrasonic-based Evaluation of NiTi Elasticity during Martensitic Transformation
	<u>Tomas Grabec</u> , Pavla Stoklasova, Petr Sedlák, Hanus Seiner
	Institute of Thermomechanics of the Czech Academy of Sciences, Czech Republic
8-0412	Simultaneous Tracking of Strain and Acoustic Emission Avalanches in Martensitic Transitions.
	Eduard Vives ¹ , Benoît Blaysat ² , Xavier Balandraud ² , Michel Grédiac ² , Noemi Barrera ³ , Giovanni Zanzotto ³
	¹ University of Barcelona, Spain, ² University of Clermont Auvergne, France, ³ University of Padua, Italy
8-0817	A Low Energy Mechanism of (20-1) Plastic Twinning in Ni-Ti Martensite
0 0017	Hanus Seiner ¹ , Petr Sedlak ¹ , Ludek Heller ² , Petr Sittner ²
	¹ Institute of Thermomechanics of the Czech Academy of Sciences, Czech Republic, ² Institute of Physics of the Czech Academy of Sciences, Czech Republic
	08 Novel Characterization of Martensite
20:40	D-21:40, March 14 (Monday) / KST ZOOM 2
Chair(s)	Wanchuck Woo (Korea Atomic Energy Research Institute, Korea)
	Minoru Nishida (Kyushu University, Japan)
8-0530	Recent Microstructure Characterization in Ti-Ni Based Shape Memory Alloys
INVITED	Minoru Nishida
	Kyushu University, Japan
8-0663	Crystallographic Features in Three Dimensional Microstructures of Fe-C-Mn Lath Martensite
INVITED	<u>Shiqekazu Morito</u> ¹ , Anh Hoang Pham ¹ , Taisuke Hayashi ¹ , Goro Miyamoto ² , Tadashi Furuhara ²
	¹ Shimane University, Japan, ² Tohoku University, Japan
8-0922	New Evaluation Methods for Martensitic Transformation Behavior of Shape Memory Alloys
INVITED	Hideki Hosoda ¹ , Yuichi Hori ¹ , Taywin Buasri ^{1,2} , Wan-Ting Chiu ¹ , Akira Umise ^{1,3} , Masaki Tahara ¹
	¹ Tokyo Institute of Technology, Japan, ² PTT Global Chemical Public Company Limited, Thailand,
	³ Tokyo Medical and Dental University, Japan

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In-situ TEM of Stress Induced Martensitic Transformation in Ni-Ti Microwires

8-0779 In-depth EBSD Investigation of Spatially Coupled Crystallographic Properties in Binary Fe-Ni Alloys

Pascal Thome¹, Mike Schneider¹, Eric J. Payton², Victoria A. Yardley³, Gunther Eggeler¹

¹Ruhr-Universität Bochum, Germany, ²Alfred University, USA, ³Impression Technologies Ltd, United Kingdom

8-0959 Measurement of Carbon Content in Martensitic Steel through γ/α ' Orientation Relationship: Application to Study Old Japanese Swords

<u>Anh Hoang Pham</u>, Takuya Ohba, Shigekazu Morito, Taisuke Hayashi, Fumio Tooyama, Masakazu Ito *Shimane University, Japan*

8-0148 Comparison of Martensite Volume Fractions among EBSD, Diffraction, and Imaging Methods in a TRIP Steel

Wanchuck Woo¹, Jongyul Kim¹, Eun-Young Kim², Shi-Hoon Choi³, Daniel S. Hussey⁴

¹Korea Atomic Energy Research Institute, Korea, ²POSCO, Korea, ³Sunchon National University, Korea, ⁴National Institute of Standards and Technology, USA

08 Novel Characterization of Martensite

21:50-22:50, March 14 (Monday) / KST

ZOOM 2

Chair(s) Yoon-Uk Heo (Pohang University of Science and Technology, Korea) Ashley Bucsek (University of Michigan, USA)

8-0364 Electron Microscopic Study of Stress-assisted Martensitic Transformation in a Medium Mn Steel

INVITED Trang Thi Thanh Tram, <u>Yoon-Uk Heo</u>

Pohang University of Science and Technology, Korea

8-1124 Probing Martensitic Phase Transformations and Twinning Across Length Scales

INVITED Using 3D X-Ray Microscopy

<u>Ashley Bucsek</u>

University of Michigan, USA

8-1405 How Human Hair Deforms Ferrous Martensite: An in-situ Study

INVITED <u>Cem Tasan</u>, Gianluca Roscioli

Massachusetts Institute of Technology, USA

8-0973 Reverse Reorientation of Martensite Variants during Compressive Unloading of a Solutionized Martensitic NiTi Shape Memory Alloy

<u>Xiao Ma</u>, Xue-Feng Zhao, Zhong-Xun Zhao, Yu-Feng Xu, Shanshan Cao, Xin-Ping Zhang South China University of Technology, China

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8-1536 EBSD Study on the Heterogeneities of Tetragonality in Fe-C Quenched Martensite

<u>Tomohito Tanaka</u>¹, Angus Wilkinson²

¹Nippon Steel Corporation, Japan, ²University of Oxford, United Kingdom

8-1726 Towards Understanding the Thermo-Mechanical Path Dependence of Structural and Functional Fatigue of NiTi Shape Memory Alloys

<u>Eathan Devine</u>, Perry Gage McCollum, William LePage *University of Tulsa, USA*

8-1795 Stress and Plastic-Strain Tensor Fields, Contact-Friction, and Plastic-Strain-Induced Phase
Transformation in Zr in Diamond Anvil Cell: Coupled Experimental-Analytical-Numerical Approach

Achyut Dhar¹, K. K Pandey², Valery I. Levitas¹

lowa State University, USA, ²Bhabha Atomic Research Center, India

03 Martensitic Transformation in Steels

19:30-20:30, March 14 (Monday) / KST

ZOOM 3

Chair(s) Young-Kook Lee (Yonsei University, Korea)

Kaneaki Tsuzaki (National Institute for Materials Science, Japan)

3-0137 Development of Internal Stress of Plate Martensite via Fcc-Hcp Martensitic Transformation

INVITED in Metastable Austenitic Stainless Steels

Yuki Wada, <u>Nobuo Nakada</u>, Susumu Onaka *Tokyo Institute of Technology, Japan*

3-0294 Evaluation of Dislocation Density and Dislocation Distribution in Lath Martensite

INVITED <u>Toshihiro Tsuchiyama</u>, Yushi Takenouchi, Keisuke Inami, Takuro Masumura *Kyushu University, Japan*

3-0247 On the Role of Microallying Elements on the Martensitic Transformation in 4 wt.-% Manganese Steels

<u>Alexander Gramlich</u>, Carina Van der Linde, Tobias Schmiedl, Tobias Melz, Wolfgang Bleck RWTH Aachen University, Germany

3-0296 Austenite Stability and Mechanical Properties of a Medium Manganese Steel with Capsulated Structure

Yong Li¹, Wei Li¹, Caiyi Zhang², Na Min³, Wenqing Liu³, Xuejun Jin¹

Shanghai Jiao Tong University, China, ²Baoshan Iron & Steel Co., Ltd., China, ³Shanghai University, China

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3-0342 Dislocation Path and Long-Range Strain Associated with the Interface Migration

<u>Jin-Yu Zhang</u>, Wen-Zheng Zhang Tsinghua University, China

03 Martensitic Transformation in Steels

20:40-21:40, March 14 (Monday) / KST

ZOOM 3

Chair(s) Yoon Suk Choi (Pusan National University, Korea)
Toshihiro Tsuchiyama (Kyushu University, Japan)

3-0633 Microstructural and Crystallographic Studies on Hydrogen-related Fracture in Martensitic Steels

INVITED Akinobu Shibata¹, Kazuho Okada², Yuji Momotani², Yu Bai², Nobuhiro Tsuji²

¹National Institute for Materials Science, Japan, ²Kyoto University, Japan

3-0910 A Mystery of Hydrogen Effects in Steel: Suppression and Promotion of Thermally-and

INVITED Deformation-induced Epsilon Martensitic Transformations

Kaneaki Tsuzaki¹, Motomichi Koyama²

¹National Institute for Materials Science, Japan, ²Tohoku University, Japan

3-0426 Excess Solute Carbon and Tetragonality in As-quenched Low- to Medium-Carbon Fe-1Mn Martensite

Naoki Maruyama¹, Shinichiro Tabata², Hiroyuki Kawata² ¹Osaka University, Japan, ²Nippon Steel Corporation, Japan

3-0448 Three-dimensional Analysis of Formation Behavior during Martensitic Transformation in Low-carbon Steel

<u>Shoichi Nambu</u>, Sho Higuchi, Tshihiko Koseki The University of Tokyo, Japan

3-0539 Static Strain Aging Behavior in 16Cr-5Ni Metastable Austenitic Stainless Steel

<u>Hojun Gwon</u>, Sung-Ho Kim, Sung-Joon Kim *Pohang University of Science and Technology, Korea*

3-0650 Variant Pairings of Lenticular Martensite in Fe-Ni-C Alloy

<u>Yuri Shinohara</u>, Satomu Akabane, Tomonari Inamura Tokyo Institute of Technology, Japan

3-0824 Formation of Ultrafine Martensite from Ferrite+Cementite Structure in 0.1C-2Si-5Mn Steel

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Shiro Torizuka, Atsushi Ito University of Hyogo, Japan

03 Martensitic Transformation in Steels

21:50-22:50, March 14 (Monday) / KST

ZOOM 3

Chair(s) Dong-Woo Suh (Pohang University of Science and Technology, Korea)
Mingxin Huang (The University of Hong Kong, Hong Kong)

3-1115 Microstructures and Defects of Medium-Carbon Steel Layers Additively Deposited

INVITED on Gray Cast Iron

<u>Yoon Suk Choi</u>, Seulbi Lee, Jaewoong Kim *Pusan National University, Korea*

3-1121 Stasis Mechanism of $\gamma \rightarrow \epsilon$ Martensitic Transformation in Fe-17Mn Alloy

INVITED Jin-Sung Hong¹, Seon-Min Choi¹, Young-Kook Lee^{1,2}

¹Yonsei University, Korea, ²Pohang University of Science and Technology, Korea

3-0839 Strengthening of Martensitic Stainless Steels by B2-(Fe,Ni)Al Intermetallics

<u>Guanghui Chen</u>^{1, 2}, Michael Harwarth¹, Alireza Zargaran³, Javad Mola¹

¹Osnabrück University of Applied Sciences, Germany, ²Wuhan University of Science and Technology, China,

³Pohang University of Science and Technology, Korea

3-0919 Effect of Thermal Cycling on the Microstructural Variation in Fe-17Mn Alloy

<u>Jin-Sung Hong</u>¹, Yoon Seok Ko², Dong-lk Kim², Young-Kook Lee^{1,3}

¹Yonsei University, Korea, ²Korea Institute of Science and Technology, Korea,

³Pohang University of Science and Technology, Korea

3-0948 A Microstructural Study of the Initially Formed Martensite in High Carbon Steels

<u>Thomas Kohne</u>¹, Tuerdi Maimaitiyili², Aimo Winkelmann³, Emad Maawad⁴, Peter Hedstroem¹,

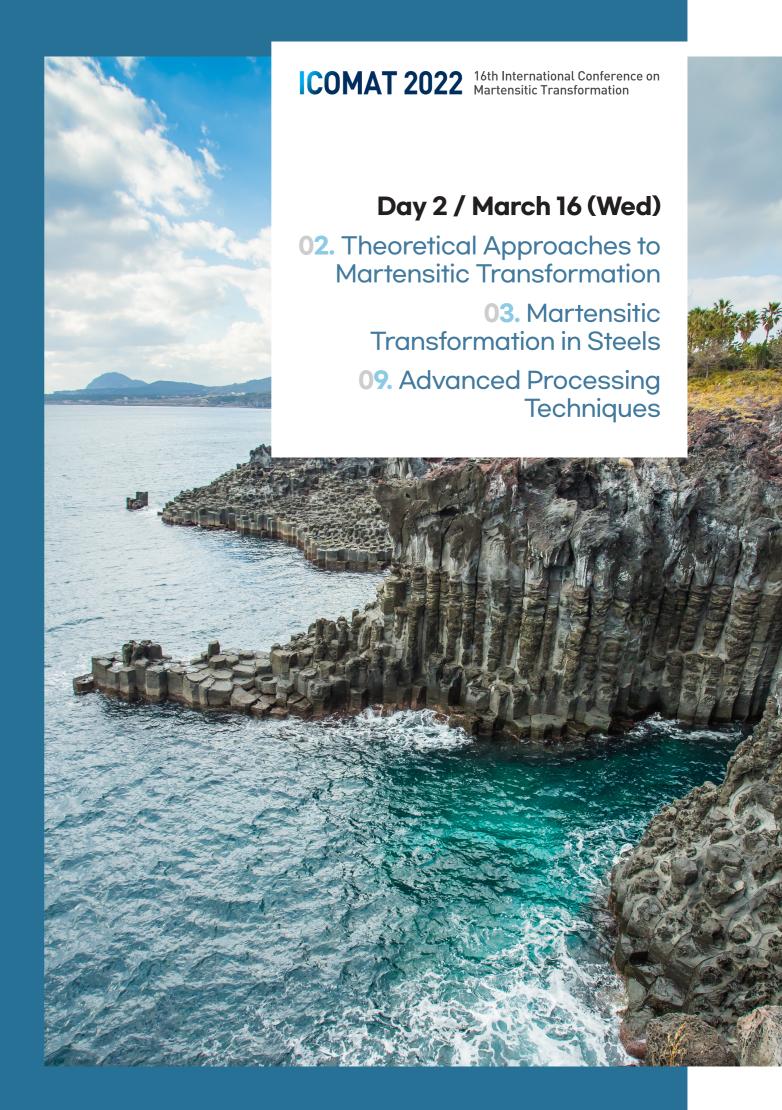
Annika Borgenstam¹

¹KTH Royal Institute of Technology, Sweden, ²Swerim AB, Sweden, ³AGH University of Science and Technology, Poland, ⁴Helmholtz-Zentrum Hereon, Germany

3-0987 Deformation Induced Martensitic Transformation at the Steels Surface and Their Influence of Fatigue and Wear Behavior

Marek Smaga¹, Tong Zhu², Tilmann Beck²

¹University of Kaiserslautern, Germany, ²Institute of Materials Science and Engineering, Germany



March 16 (Wednesday)

02 Theoretical Approaches to Martensitic Transformation

19:30-20:30, March 16 (Wednesday) / KST

ZOOM 1

Chair(s) Pil-Ryung Cha (Kookmin University, Korea)

2-0129 Multiscale Modeling Study of Deformation Mechanisms and Flaw Tolerance

INVITED of Shape Memory Ceramics

Mohsen Asle Zaeem
Colorado School of Mines, USA

2-1763 Impact of Lattice Parameter Accuracy on the Atomistic Modelling of Twin Boundaries in Ni-Ti Shape Memory Alloys

Lorenzo La Rosa, Francesco Maresca University of Groningen, Netherlands

2-0898 Phase Field Simulations Assisted New Shape Memory Alloys Design

<u>Dong Wang</u>¹, Qianglong Liang¹, Chuanxin Liang¹, Shuangshuang Zhao¹, Tianjiao Dong¹, Yunzhi Wang² Xi'an Jiaotong University, China, ²The Ohio State University, USA

2-1016 CalPhaD-assisted Evaluation of Martensite Formation in Fe-based Shape Memory Alloys

<u>Alexander Walnsch</u>, Mario Kriegel, Olga Fabrichnaya, Grzegorz Korpala, Ulrich Prahl, Andreas Leineweber Technische Universität Bergakademie Freiberg, Germany

02 Theoretical Approaches to Martensitic Transformation

20:40-21:40, March 16 (Wednesday) / KST

ZOOM 1

Chair(s) ShiHoon Choi (Sunchon National University, Korea)
Avadh Saxena (Los Alamos National Laboratory, USA)

2-1768 Development of Research Methodologies for Comprehending the Effect of Martensite

NVITED on Deformation and Fracture Behavior of Multi-phase Steels

ShiHoon Choi

Sunchon National University, Korea

2-1066 Theory and Modeling of the Austenite-martensite Interface Structure and Glissile Transformation in Steels

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<u>Francesco Maresca</u>¹, William Curtin²

¹University of Groningen, Netherlands, ²Swiss Federal Institute of Technology Lausanne, Switzerland

2-1613 A Mechanism of Austenite Grain Size Dependency of Ms by Stored Elastic Energy in Neighbor Parent Grains

<u>Toshiro Tomida</u>, Shigeo Sato *Ibaraki University, Japan*

2-1638 Can Metastable Face-Centered-Cubic Materials with a Positive SFE Form Martensite?

Konstantin Victor Werner, Frank Niessen, Matteo Villa, Marcel A.J. Somers Technical University of Denmark, Denmark

2-1808 A Multiphase Phase Field Study of 3D Martensitic Microstructures and Matrix-precipitate Interface-induced Martensitic Transformations

Anup Basak¹, Valery Levitas²

¹Indian Institute of Technology Tirupati, India, ²Iowa State University, USA

2-1268 An Atomic-scale Characterization of Micro-/Nano-Mechanism of Stress-induced Martensitic Transformation in NiTi Shape Memory Alloys Using Molecular Dynamics Simulation

<u>Shuai Liu</u>, Chang-Bo Ke, Shanshan Cao, Xiao Ma, Xin-Ping Zhang South China University of Technology, China

02 Theoretical Approaches to Martensitic Transformation

21:50-22:50, March 16 (Wednesday) / KST

ZOOM 1

Chair(s) Kyoungdoc Kim (Pohang University of Science and Technology, Korea) Petr Sittner (Institute of Thermomechanics of the Czech Academy of Sciences, Czech Republic)

2-1088 Predicting Martensitic Transformation in Ti Alloys

INVITED Pedro Rivera-Diaz-del-Castillo¹, Madeleine Bignon², Emmanuel Bertrand², Franck Tancret²

¹Lancaster University, United Kingdom, ²University of Nantes, France

2-0513 Flexocaloric Effects in Ferroic Materials

INVITED Avadh Saxena¹, Marcel Porta², Teresa Castan², Antoni Planes²

1Los Alamos National Laboratory, USA, 2University of Barcelona, Spain

2-1684 Formation of Modulated Martensite in Mn-Rich Ni-Mn-In Alloys

<u>Danil Baigutlin</u>^{1,2}, Vladimir Sokolovskiy^{1,3}, Ksenia Erager¹, Olga Miroshkina^{1,4}, Markus Gruner⁴, Vasiliy Buchelnikov^{1,3}, Bernardo Barbiellini^{2,5}, Erkki Lahderanta²

¹Chelyabinsk State University, Russia, ²Lappeenranta University of Technology, Finland, ³National University of Science and Technology "MISIS", Russia, ⁴University of Duisburg-Essen, Germany, ⁵Northeastern University, USA

2-1786 Study of Martensitic Phase Transformation in Zirconium Using Scale-Free Phase-Field Model

Raghunandan Pratoori, Hamed Babaei, Valery Levitas Iowa State University, USA

2-1800 Nontrivial Nanostructure, Stress Relaxation Mechanisms, and Crystallography for Pressure-Induced Si-I to Si-II Phase Transformation

Hao Chen¹, Valery Levitas², Dmitry Popov³, Nenad Velisavljevic⁴

¹East China University of Science and Technology, China, ²Iowa State University, USA, ³Argonne National Laboratory, USA, ⁴Lawrence Livermore National Laboratory, USA

2-0837 Percolated Strain Networks and Universal Scaling Properties of Strain Glasses

Hongxiang Zong, Xuefei Tao, <u>Xiangdong Ding</u> Xi'an Jiaotong University, China

09 Advanced Processing Techniques

19:30-20:30, March 16 (Wednesday) / KST

ZOOM 2

Chair(s) Jung Gi Kim (Gyeongsang National University, Korea)
Dominique (Nick) Schryvers (University of Antwerp, Belgium)

9-1157 Multiscale Microstructures in Titanium Alloys Manufactured by Additive Manufacturing

INVITED Jae-Keun Hong, Jae Hyeok Kim, P.L. Narayana, Jae-Hyun Lee, Seong-Woo Choi, Sang-Won Lee,

Chan Hee Park, Jong-Taek Yeom Korea Institute of Materials Science, Korea

9-1181 Effect of Hot Isostatic Pressing on Microstructural Transformation of Ti-6Al-4V Alloys produced by Selective Laser Melting

<u>Sangeun Park</u>¹, Jungsub Lee², Im Doo Jung³, Sangshik Kim¹, Hyokyung Sung¹
¹Gyeongsang National University, Korea, ²Doosan, Korea, ³Ulsan National Institute of Science and Technology, Korea

9-1245 Enhanced Microstructural Homogeneity of Additive Manufactured Titanium Alloys via Microalloying

<u>Jae H. Kim</u>, P.L. Narayana, Sang-Won Lee, Chan Hee Park, Jong-Taek Yeom, Jae-Keun Hong *Korea Institute of Materials Science, Korea*

9-0292 Tailoring the Deformation Behavior of Stainless Steels with Additive Manufacturing

<u>Christos Sofras</u>¹, Jan Capek¹, Ariyan Arabi-Hashemi², Christian Leinenbach², Markus Strobl¹, Efthymios Polatidis¹ Paul Scherrer Institute, Switzerland, ²Swiss Federal Laboratories for Materials Science and Technology, Switzerland

9-1584 Fabrication of a Superelastic Cu-Al-Mn Shape Memory Alloy by Laser Powder Bed Fusion

Nazim Babacan^{1, 2}, Simon Pauly^{1, 3}, Uta Kühn¹, Thomas Gemming¹, <u>Tobias Gustmann</u>¹

Leibniz Institute for Solid State and Materials Research (IFW) Dresden, Germany, ²Sivas University of Science and Technology, Turkey, ³University of Applied Sciences Aschaffenburg, Germany

09 Advanced Processing Techniques

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20:40-21:40, March 16 (Wednesday) / KST

ZOOM 2

Chair(s) Heung Nam Han (Seoul National University, Korea)
Haiwen Luo (University of Science and Technology Beijing, China)

9-0153 Strengthening and Reverse Transformation Mechanism during Ultrafast Heating

INVITED of Medium Mn Steel: Martensitic, Massive or Bainitic?

Haiwen Luo

University of Science and Technology Beijing, China

9-0645 Microstructure Reset of Metastable Austenitic Alloys by Subsecond Electric Pulsing

Heung Nam Han¹, Hye-Jin Jeong¹, Moon-Jo Kim², Ju-Won Park¹, Howook Choi¹, Viet Tien Luu³, Sung-Tae Hong³

1 Seoul National University, Korea, Korean Institute of Science and Technology, Korea, University of Ulsan, Korea

9-1532 Metastable Phase Decomposition in the Additively Manufactured Fe-Cu-Ni Maraging Steel

Jung Gi Kim¹, Eric Jägle², Jae Bok Seol¹, Hyokyung Sung¹, Woojin An¹, Jonghyun Jeong¹, Moritz Roscher³ 'Gyeongsang National University, Korea, ²Universität der Bundeswehr München, Germany, ³Max Planck Institut fuer Eisenforschung, Germany

9-0500 Additive Manufacturing of NiTi-based Shape Memory Alloys

Aaron Stebner¹, Behnam Aminahmadi¹, John Fuller¹, Anthony Manerbino², Jeremy Iten², Jacob Nuechterlein², Koichi Tsuchiya³, Ivan Gutierrez³

¹Colorado School of Mines, USA, ²Elementum 3D, USA, ³National Institute for Materials Science, Japan

9-1355 An Effective Approach to Produce Nanocrystalline Ni–Ti Shape Memory Alloy

INVITED without Severe Plastic Deformation

<u>Chan Hee Park</u>¹, Jae-Keun Hong¹, Tae-Hyun Nam², Jong-Taek Yeom¹

¹Korea Institute of Materials Science, Korea, ²Gyeongsang National University, Korea

9-1021 Additive Manufacturing of Shape Memory Alloys – On the Challenges Towards Robust Applications

<u>Thomas Niendorf</u>, Tizian Arold, Julia Richter, Christian Lauhoff, Niklas Sommer, Stefan Böhm, Florian Brenne, Malte Vollmer, Philipp Krooss *University of Kassel, Germany*

9-1781 Improved Fatigue Life of Ni-Ti Shape Memory Alloy with Surface Gradient Residual Stress Layers and Heterogeneous Nanostructure Fabricated by Pre-strain Laser Shock Peening

<u>Kai Yan</u>^{1, 2}, Pengbo Wei^{1, 2}, Kangjie Chu¹, Fuzeng Ren², Weifeng He^{3, 4}, Qingping Sun¹

¹Hong Kong University of Science and Technology, China, ²Southern University of Science and Technology, China, ³Xi'an Jiaotong University, China, ⁴Airforce Engineering University, China

03 Martensitic Transformation in Steels

19:30-20:30, March 16 (Wednesday) / KST

ZOOM 3

Chair(s) ShiHoon Choi (Sunchon National University, Korea)
Nobuo Nakada (Tokyo Institute of Technology, Japan)

3-1151 Revisit the TRIP Effect on Work Hardening Behavior of Steels at High Strain Rate

INVITED M Wang, M.X. Huang

The University of Hong Kong, Hong Kong

3-1075 Cyclic Behaviour of Metastable Austenitic 304L Steel Fabricated by Selective Laser Melting

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Miroslav Smid¹, Michal Jambor¹, Daniel Koutny², Stanislava Fintova¹, Ivo Kubena¹

¹Institute of Physics of Materials, Czech Academy of Sciences, Czech Republic, ²Brno University of Technology, Czech Republic

3-1261 Effects of Volume Change by Phase Transformation on Reverse Transformation Induced by Shot-Peening for Fe Alloys

<u>Hisashi Sato</u>, Takuto Tominaga, Tomokazu Moritani, Yoshimi Watanabe *Nagoya Institute of Technology, Japan*

3-1303 Effect of Microstructure and Strain Characteristics on Hydrogen Embrittlement of Q&P Steel for Automotive

<u>Hye-Jin Kim</u>¹, Seung-Pill Jung¹, Hyun-Yeong Jung¹, Joo-Sik Hyun¹, Myoung-Gyu Lee²

1 Hyundai Steel, Korea, 2 Seoul National University, Korea

3-1322 Carbon and Microalloy Additions for Higher Crashworthiness on Hot Stamped Martensitic Steel

<u>Byung-Gil Yoo</u>¹, Jewoosoo Kim¹, Zhe Gao², Seok-Hyeon Kang¹, Dong Yong Kim¹, Seong Kyung Han¹, Jae-Il Jang², Seong Ju Kim¹

¹Hyundai Steel, Korea, ²Hanyang University, Korea

3-1337 Behavior of Martensitic Transformation during Low-pressure Carburizing of Low-alloy Steel

<u>Gi Hoon Kwon</u>^{1,2}, Minsu Jung¹, Kyoung II Moon¹, Young Kook Lee² ¹Korea Institute of Industrial Technology, Korea, ²Yonsei University, Korea

03 Martensitic Transformation in Steels

20:40-21:40, March 16 (Wednesday) / KST

ZOOM 3

Chair(s) Chang-Hoon Lee (Korea Institute of Materials Science, Korea) Takahito Ohmura (National Institute for Materials Science, Japan)

3-1199 Comparison of Driving Force Necessary for Bainite and Martensite Transformations in Steels

INVITED Goro Miyamoto, Tadashi Furuhara
Tohoku University, Japan

3-1233 Screw Dislocation Driven Martensitic Nucleation

INVITED <u>Tae-Ho Lee</u>¹, Sung-Dae Kim¹, Heon-Young Ha¹, Jae Hoon Jang¹, Joonoh Moon¹, Jun-Yun Kang¹, Chang-Hoon Lee¹, Seong-Jun Park¹, Wanchuck Woo², Jong-Ho Shin³, Jong-Wook Lee³, Dong-Woo Suh⁴, Hyun-Uk Hong⁵

¹Korea Institute of Materials Science, Korea, ²Korea Atomic Energy Research Institute, Korea, ³Doosan Heavy Industries and Construction Co., Ltd., Korea, ⁴Pohang University of Science and Technology, Korea, ⁵Changwon National University, Korea

3-1339 Mechanical Property and Microstructure of Hot Stamped and Partitioned Medium Manganese Steel

Woojun Kim¹, Donghwi Kim¹, Jee-Hyun Kang², Sung-Joon Kim¹

¹Pohang University of Science and Technology, Korea, ²Yeungnam University, Korea

3-1467 Accelerated Degradation in Creep Behavior of Heat Affected Zone of a 9Cr Martensitic Heat

<u>Jin-Yoo Suh</u>, Sung-Min Hong, Myung-Yeon Kim, Jee-Hwan Bae, Dong Won Chun, Jae-Hyeok Shim, Dong-Ik Kim, Woo-Sang Jung

Korea Institute of Science and Technology, Korea

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3-1487 Influence of Processing Parameters on Size and Morphology of Microstructural Constituents in Low Carbon MartensIte

Matthieu Salib¹, Sebastian Cobo¹, Nicolas Charbonnier¹, Loic Caoduro¹, Lionel Germain²

¹Arcelormittal, France, ²Université de Lorraine, France

3-1565 The Effect of Ageing on the Microstructural Evolution in a New Design of Maraging Steel with Carbon

Mark Rainforth¹, <u>Peng Gong</u>¹, Enrique Galindo-Nava², Mark Rainforth¹, Alexander Knowles³

¹University of Sheffield, United Kingdom, ²University College London, United Kingdom,

³University of Birmingham, United Kingdom

03 Martensitic Transformation in Steels

21:50-22:50, March 16 (Wednesday) / KST

ZOOM 3

Chair(s) Jin-Yoo Suh (Korea Institute of Science and Technology, Korea) Goro Miyamoto (Tohoku University, Japan)

3-1443 Nano-mechanical Characterization in Constituent Phases of Steels for Interpretation

INVITED of Macroscopic Deformation Behavior

Takahito Ohmura 1, 2

¹National Institute for Materials Science, Japan, ²Kyushu University, Japan

-1738 Temperature-dependent Tension-compression Asymmetry of TRIP Stainless Steel Studied

INVITED by in-situ High-energy XRD

Matthias Bönisch KU Leuven, Belgium

3-1618 Reverse Martensite Transformation in the Quenching and Partitioning (Q&P) Steels via Rapid Cooling Process

<u>Cheng Luo</u>, Yansong Zhang Shanghai Jiao Tong University, China

3-1721 Effect of Variant Selection on Martensitic Transformation induced Deformation of Ferrite in DP Steels

<u>Vibhor Atreya</u>¹, Jan Steven van Dokkum¹, Cornelis Bos^{1, 2}, Maria Jesus Santofimia¹ Delft University of Technology, Netherlands, ²Tata Steel R&D, Netherlands

3-1772 Formation of Twin Related Martensitic Laths during Resistance Spot Welding of BH340 Steel

<u>Saurabh Pawar</u>¹, Abhishek Kumar Singh¹, Lalit Kaushik¹, Ki-Seong Park¹, JaeHyeok Shim², Shi-Hoon Choi¹ Sunchon National University, Korea, ² Korea Institute of Science and Technology, Korea



March 17 (Thursday)

05 Magnetic Shape Memory Alloys

19:30-20:30, March 17 (Thursday) / KST

ZOOM 1

Chair(s) Yeon-wook Kim (Keimyung University, Korea)

5-0203 Ferromagnetic Heusler Shape-Memory Alloys: Materials for Energy Applications

INVITED Antoni Planes

University of Barcelona, Spain

5-1014 Role of Antiphase Boundaries in Martensitic Transformation and Magnetic Shape Memory Effect

INVITED Oleg Heczko

Institute of Physics of the Czech Academy of Sciences, Czech Republic

5-0629 Utilizing Metamagnetic Shape Memory Particles for Crack Detection in Structural Material

<u>Woohyun Cho</u>, Ibrahim Karaman, Nick Barta Texas A&M University, USA

5-0668 Martensitic Transformation and Metamangetic Transition in Pd₂MnGa-based Alloys

<u>Tatsuya Ito</u>¹, Xiao Xu¹, Atsushi Miyake², Yuto Kinoshita², Makoto Nagasako¹, Toshihiro Omori¹, Masashi Tokunaga², Ryosuke Kainuma¹

¹Tohoku University, Japan, ²The University of Tokyo, Japan

5-1030 Evolution of Magnetic Properties in Ni-Mn-Ga Microparticles Following Extensive Milling Regime

Paweł Czaja¹, Robert Chulist¹, Anna Wójcik¹, Wojciech Maziarz¹, Magdalena Fitta², Janusz Przewoźnik³

¹Institute of Metallurgy and Materials Science, Polish Academy of Sciences, Poland, ²Institute of Nuclear Physics, Poland, ³AGH University of Science and Technology, Poland

5-0929 Martensitic Transformation in Fe-Ga Alloys

Junming Gou¹, Xiaolian Liu², <u>Tianyu Ma</u>¹

¹Xi'an Jiaotong University, China, ²Hangzhou Dianzi University, China

05 Magnetic Shape Memory Alloys

20:40-21:40, March 17 (Thursday) / KST

ZOOM 1

Chair(s) Yeon-wook Kim (Keimyung University, Korea)
Antoni Planes (Universitat de Barcelona, Spain)

5-1024 A First-principles Perspective on the Interplay of Magnetism and Microstructure

INVITED in Ni-Mn-based Heusler Alloys

Markus Ernst Gruner

University of Duisburg-Essen, Germany

5-1064 Simultaneous Investigation of Acoustic and Magnetic Emission during Jerky Twin Boundary Motion in Single-Crystalline Ni₂MnGa

<u>László Zoltán Tóth</u>¹, Emil Bronstein², Lajos Daróczi¹, Doron Shilo², Dezső L. Beke¹ *University of Debrecen, Hungary, ²Technion, Haifa, Israel*

5-0759 Optimizing the Caloric Properties of Cu-Doped Ni-Mn-Ga Alloys

<u>Concepcio Segui</u>¹, Eduard Cesari¹, Joan Torrens-Serra¹, Patricia Lazpita²

¹University of the Balearic Islands, Spain, ²Universidad del Pais Vasco, Spain

5-1637 Tracking Twin Boundary Jerky Motion at Nanometer and Microsecond Scales

<u>Emil Bronstein</u>¹, László Tóth², Lajos Daróczi², Dezső Beke², Ronen Talmon¹, Doron Shilo ¹Technion, Haifa, Israel, ²University of Debrecen, Hungary

5-0832 Universal Temperature Dependence of Twinning Stress in Ni-Mn-Ga 10M Martensite

Ladislav Straka^{1, 2}, Denys Musiienko¹, Ross H. Collman², Andrew Armstrong³, Oleg Heczko^{1, 2}

¹Institute of Physics of the Czech Academy of Sciences, Czech Republic, ²Charles University, Czech Republic,

³Boise State University, USA

5-0899 Martensitic Transformation and Magnetic Properties of Co₆₄V₁₅(Si_{21-x}Al_x) Alloys

Kousuke Nakamura¹, Atsushi Miyake², <u>Xiao Xu</u>¹, Toshihiro Omori¹, Masashi Tokunaga², Ryosuke Kainuma¹ Tohoku University, Japan, ²The University of Tokyo, Japan

5-0851 Revival of Martensitic Transformation through Annealing in Ni-Mn-Ga and Ni-Mn-Fe-Ga Magnetic Shape Memory Alloy Powders

<u>Wojciech Maziarz</u>¹, Robert Chulist¹, Anna Wójcik¹, Łukasz Rogal¹, Paweł Czaja¹, Aleksandra Kolano-Burian², Maciej Kowalczyk³, Przemysław Zackiewicz²

¹Institute of Metallurgy and Materials Science, Polish Academy of Sciences, Poland, ²Łukasiewicz Research Network -Institute of Non-Ferrous Metals, Gliwice, Poland, ³Warsaw University of Technology, Poland

05 Magnetic Shape Memory Alloys

21:50-22:50, March 17 (Thursday) / KST

ZOOM 1

Chair(s) Eunsoo Choi (Hongik University, Korea)

Oleg Heczko (FZU - Institute of Physics of the Czech Academy of Sciences, Czech Republic)

5-1053 Beam- and Non-Beam-based Additive Manufacturing and Post-Processing

INVITED of Functional Magnetic Materials

Markus Chmielus¹, Peter Mullner², Jakub Toman^{3,4}

¹University of Pittsburgh, USA, ²Boise State University, USA, ³University of Pittsburgh, USA, ⁴Idaho National Laboratory, USA

5-1063 Structural Compatibility and Magnetocaloric Measurement Protocols

in Ni-Pt-Mn-In Magnetic Shape Memory Alloy

Krishna Kant Dubey¹, Parul Devi^{2,3}, Anupam Kumar Singh¹, Sanjay Singh¹

¹Indian Institute of Technology (BHU) Varanasi, India, ²Max Planck Institute for Chemical Physics of Solids, Germany, ³Iowa State University, USA

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5-0752 Ni-Mn-Ga Magnetic Shape Memory Alloy for Micro-magneto-mechanical Systems

<u>Denys Musiienko</u>¹, Straka Ladislav¹, Jan Maňák¹, Andrey Saren², Ladislav Klimša¹, Jaromír Kopeček¹, Kari Ullakko², Oleg Heczko¹

¹Institute of Physics of the Czech Academy of Sciences, Czech Republic, ²Lappeenranta-Lahti University of Technology, Finland

5-1392 Enhancing Temperature Stability for Large Magnetostriction in (1-x)TbFe₂-xDyCo₂ Ferromagnetic System

<u>Hui Zhao</u>, Yuanchao Ji, Xiaobing Ren *Xi'an Jiaotong University, China*

5-0774 Temperature Evolution of the Modulation Vector in 10M Martensite of Ni-Mn-Ga(-Fe) Alloys

Petr Veřtát^{1, 2}, Ladislav Straka^{1, 3}, Milan Klicpera³, Hanuš Seiner⁴, Alexei Sozinov⁵, Oleg Heczko¹

¹Institute of Physics of the Czech Academy of Sciences, Czech Republic, ²Czech Technical University in Prague, Czech Republic, ³Charles University, Czech Republic, ⁴Institute of Thermomechanics of the Czech Academy of Sciences, Czech Republic, ⁵Lappeenranta-Lahti University of Technology, Finland

5-1654 Systematical Investigation on Martensitic Transformation Hysteresis in (Ni-Co)₅₀-Mn-Sn Metamagnetic Shape Memory Alloys

<u>Tomoya Miyakawa</u>¹, Atsushi Miyake², Xiao Xu¹, Masashi Tokunaga², Toshihiro Omori¹, Ryosuke Kainuma¹ *Tohoku University, Japan*, *The University of Tokyo, Japan*

5-1060 Self-constrained Microstructure Evolution of Ni-Mn-Ga Melt Spun Ribbons and 3D Printings

<u>Anna Wójcik</u>¹, Robert Chulist¹, Maciej Kowalczyk², Rafał Wróblewski², Łukasz Żrodowski², Paweł Czaja¹, Arkadiusz Szewczyk¹, Xi Li³, Wojciech Maziarz¹

¹Polish Academy of Sciences, Poland, ²Warsaw University of Technology, Poland, ³Shanghai University, China

04 Novel Shape Memory Alloys

19:30-20:30, March 17 (Thursday) / KST

ZOOM 2

Chair(s) Jaeil Kim (Dong-A University, Korea)

Yinong Liu (The University of Western Australia, Australia)

4-1309 FCC-HCP Martensitic Transformation and Shape Memory Effect in High-Entropy Alloys

INVITED Koichi Tsuchiya¹, Je In Lee², Wataru Tasaki³, Takahiro Sawaguchi¹

¹National Institute for Materials Science, Japan, ²Pusan National University, Korea, ³National Institute for Materials, Japan

4-0431 Wide-Temperature-Range Superelasticity in Fe-Mn-Al-Ni Alloy

<u>Toshihiro Omori</u>, Ji Xia, Xiao Xu, Ryosuke Kainuma *Tohoku University, Japan*

4-0506 Cu-Al-Ni-Be Shape Memory Alloys with Very Low Transformation Temperatures for Cryogenics Applications

Patricia Lorenzo, Jose Fernando Gómez-Cortés, Tomasz Breczewski, Mikel Perez-Cerratoc, Isabel Ruiz-Larrea, Jose San Juan, <u>Maria L. Nó</u> *Universidad del País Vasco, Spain*

4-0541 Abnormal Behavior in Elastocaloric Effect at Low Temperatures in Co-Cr-Al-Si Alloys

Takumi Odaira, Sheng Xu, <u>Xiao Xu</u>, Toshihiro Omori, Ryosuke Kainuma *Tohoku University, Japan*

4-1822 A Non-magnetic Elinvar High-damping Mn-Cu Strain Glass Achieved by Spinodal Decomposition

Wenjia Wang¹, Pu Luo¹, Yuanchao Ji¹, Xiaobing Ren²

¹Xi'an Jiaotong University, China, ²National Institute for Materials Science, Japan

4-0755 Superelastic Effect at the Nano-scale in Cu-Al-Ni-X Quaternary Shape Memory Alloys by Nano-compression Tests

<u>Jose Fernando Gómez-Cortés</u>, Patricia Lorenzo, Mikel Pérez-Cerrato, Maria Luisa Nó, Jose Maria San Juan *Universidad del País Vasco, Spain*

04 Novel Shape Memory Alloys

20:40-21:40, March 17 (Thursday) / KST

ZOOM 2

Chair(s) Jaeil Kim (Dong-A University, Korea)

Koichi Tsuchiya (National Institute for Materials Science, Japan)

4-0355 Martensite Microstructure and Shape Memory Effect of a Ti-16Nb High Temperature

INVITED Shape Memory Alloy Subjected to Thermomechanical Treatment

<u>Xianglong Meng</u>, Bin Sun, Liancheng Zhao Harbin Institute of Technology, China

4-0184 Exploration of Novel Shape Memory Alloys for Elastocaloric Refrigeration

NVITED <u>Daoyong Cong</u>, Zhi Yang, Shaohui Li, Yuxian Cao, Shengwei Li, Yandong Wang University of Science and Technology Beijing, China

4-0225 Ti-Ni Based Shape Memory Alloy Exhibiting High Glass Forming Ability

INVITED Woo Chul Kim¹, Yeong Seong Kim¹, Jeong Soo Kim¹, Yong Joo Kim¹, Jae Ik Hyun¹, Won Tae Kim², <u>Do Hyang Kim</u>¹

'Yonsei University, Korea, ²Cheongju University, Korea

4-0883 Recent Progress on Ti-Ta-based High Temperature Shape Memory Alloys

<u>Jan Frenzel</u>, Alexander Paulsen, Gunther Eggeler *Ruhr-Universität Bochum, Germany*

4-1384 Stabilization of the Martensitic Transformation Temperatures in Ti-Zr-Pd High Temperature Shape Memory Alloys

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Hirobumi Tobe^{1, 2}, Shori Ohara³, Eiichi Sato^{1, 2}

¹Institute of Space and Astronautical Science, Japan, ²Japan Aerospace Exploration Agency, Japan, ³The University of Tokyo, Japan

4-1605 Analytical and Experimental Study on the Bending of SMA Beams Considering the Asymmetric Effect of Martensitic Transformation

Alireza Ostadrahimi, Eunsoo Choi Hongik University, Korea

04 Novel Shape Memory Alloys

21:50-22:50, March 17 (Thursday) / KST

ZOOM 2

Chair(s) Jaeil Kim (Dong-A University, Korea)

Aaron Stebner (Georgia Institute of Technology, USA)

4-0453 Temperature-dependence of Critical Stresses in Nanocrystalline NiTi Alloys

INVITED Kaiyuan Yu¹, Taotao Wang², Zhiyuan Ma¹, Yang Ren³, Lishan Cui¹

¹China University of Petroleum-Beijing, China, ²Shaanxi University of Technology, China, ³City University of Hong Kong, China

4-1119 Design of Fatigue-Resistant Shape Memory Alloys for Additive Manufacturing

INVITED Chuan Liu¹, G. B. Olson²

¹Northwestern University, USA, ²Massachusetts Institute of Technology, USA

4-1713 Observations and Explanations of a Non-typical Elinvar Effect on Cooling of Thermomechanically Treated Ti-Nb-Zr Alloy

<u>Sergey Dubinskiy</u>¹, Galina Markova², Alexandra Baranova¹, Sergey Prokoshkin¹, Vladimir Brailovski³
¹National University of Science and Technology "MISIS", Russia, ²Tula State University, Russia,
³Ecole de technologie superieure, Canada

4-1753 Atomic Mobilities and Martensitic Transformations in NiTi-based Shape Memory Alloys with Chemical Gradients

<u>Oluwaseyi. S Oluwabi</u>, Jan Frenzel, Gunther Eggeler *Ruhr-Universitat Bochum, Germany*

4-1758 Effect of Process Parameters and Post-treatment on the Mechanical Behavior of High Temperature Shape Memory Alloy NiTi-20Hf Produced by Laser Powder Bed Fusion

<u>Timothée Cullaz</u>¹, Luc Saint-Sulpice¹, Laurent Pino¹, Mohammadreza Nematollahi², Keyvan Safaei², Mohammad Elahinia², Shabnam Arbab Chirani¹

¹Ecole Nationale d'Ingénieurs de Brest, France, ²The University of Toledo, USA

1-0891 Understanding the Phase Equilibrium between H-phase Precipitates and Martensitically Transforming B2/B19' Phase in NiTiHf High Temperature Shape Memory Alloy System

<u>Tejas Umale</u>, Andrew Mott, Winson Kuo, Raymundo Arroyave, Ibrahim Karaman *Texas A&M University, USA*

4-0907 (NiCu)(TiZrHf) Multicomponent High Temperature Shape Memory Alloys

Malesela Mahlatji, <u>Daniel Salas Mula</u>, Kadri Can Atli, Tejas Umale, Ibrahim Karaman *Texas A&M University, USA*

4-1087 Improvement of FeMnSi Based Shape Memory Alloys Recovery Stress by Heat Treatment

Yajiao Yang^{1,2}, Christian Leinenbach¹, Ariyan Arabi-Hashemi¹, Rainer Fluch³, Julien Michels⁴, Moslem Shahverdi^{1,5}
¹Swiss Federal Laboratories for Materials Science and Technology, Switzerland, ²Laboratory for Multifunctional Ferroic Materials, Switzerland, ³Voestalpine BÖHLER Edelstahl GmbH & Co KG, Austria, ⁴Re-fer AG, Switzerland, ⁵University of Tehran, Iran

06 Martensitic Transformations in Non-ferrous Materials

19:30-20:30, March 17 (Thursday) / KST

ZOOM 3

Chair(s) Jae Bok Seol (Gyeongsang National University, Korea)

6-0623 Microstructures and High Cycle Fatigue Properties of Ti-Al-Fe-Si Based Alloys

INVITED Dongyi Seo¹, Sangwon Lee², Jong-Taek Yeom², Jae-Keun Hong²

¹National Research Council Canada, Canada, ²Korea Institute of Materials Science, Korea

6-0347 Effect of Aging Temperature and Time on Microstructure and Hardness of Ti-6Al-4V with ω phase

<u>Seongji Seo</u>^{1, 2}, Geeyoung Lee³, Hojoon Choi¹, Kee-Ahn Lee⁴, Jeongho Han², Jiyong Park¹, Minsu Jung¹ Korea Institute of Industrial Technology, Korea, ²Hanyang University, Korea, ³KPC Metal Co., Ltd., Korea, ⁴Inha University, Korea

6-1169 Deformation Mechanism of a Metastable Titanium Alloy Showing a Stress-induced α'-Martensitic Transformation

<u>Sang Won Lee</u>, Jeong Mok Oh, Chan Hee Park, Jae-Keun Hong, Jong-Taek Yeom *Korea Institute of Materials Science, Korea*

6-0520 Crystallographic Analysis of Stress-induced Martensite in Ti-Mo-Al Alloy Single Crystal

<u>Masaki Tahara</u>, Ryotaro Hara, Tomonari Inamura, Hideki Hosoda Tokyo Institute of Technology, Japan

6-0549 In-situ Electron-microscopy Analysis of α" Martensite Formation in Metastable β Ti-10V-2Fe-3Al during 3-point Micro-bending Testing

<u>Frank Niessen</u>¹, David Mitchell¹, Ahmed A. Saleh¹, Abhishek Bhattacharyya², Ricardo A. Lebensohn², Azdiar A. Gazder¹, Elena V. Pereloma¹

¹University of Wollongong, Australia, ²Los Alamos National Laboratory, USA

06 Martensitic Transformations in Non-ferrous Materials

20:40-21:40, March 17 (Thursday) / KST

ZOOM 3

Chair(s) Dongyi Seo (National Research Council Canada, Canada)
Tomonari Inamura (Tokyo Institute of Technology, Japan)

6-0767 Metastable Phase Evolution and Deformation Mode Transition in β-type Titanium Alloys

INVITED Xiaohua Min

Dalian University of Technology, China

6-1543 Mechanical Characterization of the Stress-induced Martensitic Transformation: A Case Example in the Ti-xMo System

<u>Lola Lilensten</u>¹, Jérémy Da Conceiçao¹, Inès Danard¹, Bingnan Qian¹, Azziz Hocini², Guy Dirras², Fan Sun¹, Philippe Vermaut¹, Frédéric Prima¹

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¹Institut de Recherche de Chimie Paris - CNRS, France, ²Laboratoire des Sciences des Procédés et des Matériaux, France

6-0842 Mechanical and Structural Characterization of Triple Functional Ti-Mo-Sn Alloys with High Stress and Strain

Mustafa Babanli¹, Vusal Huseynov¹, <u>Sayami Huseynov</u>¹, Lesya Demchenko², Anatoliy Titenko³
¹Azerbaijan State Oil and Industry University, Azerbaijan, ²National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine, ³Institute of Magnetism of National Academy of Sciences of Ukraine, Ukraine

6-0283 Disorder Enhanced Dynamical Heterogeneity in Strain Glass Alloys

<u>Xuefei Tao</u>, Hongxiang Zong, Xiangdong Ding *Xi'an Jiaotong University, China*

6-0301 Strain Glass and Its Related Phase Diagrams

Shuai Ren¹, Dezhen Xue², Xiangdong Ding², Xiaobing Ren^{2,3}

¹Shenzhen University, China, ²Xi'an Jiaotong University, China, ³National Institute for Materials Science, Japan

06 Martensitic Transformations in Non-ferrous Materials

21:50-22:50, March 17 (Thursday) / KST

ZOOM 3

Chair(s) Jeoung Han Kim (Hanbat National University, Korea) Hideki Hosoda (Tokyo Institute of Technology, Japan)

6-0279 Transformation – Plasticity Coupling in Thermomechanical Loading of Nanocrystalline NiTi

INVITED

<u>Petr Sittner</u>^{1,2}, Petr Sedlák^{2,3}, Luděk Heller^{1,2}, Hanuš Seiner³, Ondřej Tyc^{1,4}, Lukáš Kadeřávek^{1,4}, Orsolya Molnárová¹, Yuchen Chen⁵

¹Institute of Physics of the Czech Academy of Sciences, Czech Republic, ²Nuclear Physics Institute of the Czech Academy of Sciences, Czech Republic, ³Institute of Thermomechanics of the Czech Academy of Sciences, Czech Republic,

⁴Czech Technical University in Prague, Czech Republic, ⁵Nanjing University of Aeronautics and Astronautics, China 60 Functional Stability and Elastocaloric Effect of Ti-rich TiNi Shape Memory Ribbon

<u>Chih-Hsuan Chen</u>, Nian-Hu Lu National Taiwan University, Taiwan

6-0473 Effect of Microstructure on Fatigue of Superelastic NiTi Wires

Ondřej Tyc, Orsolya Molnárová, Petr Šittner
Institute of Physics of the Czech Academy of Sciences, Czech Republic

6-0504 Tensile Fatigue of Superelastic NiTi Wires in Wide Range of Stress-temperature Conditions

<u>Lukáš Kadeřávek</u>^{1,2}, Petr Šittner^{1,2}, Luděk Heller^{1,2}, Ladislav Klmiša^{1,2}, Orsolya Molnárová¹

Institute of Physics of the Czech Academy of Sciences, Czech Republic, ²Nuclear Physics Institute of the Czech Academy of Sciences, Czech Republic

6-0740 Enhanced Two-way Shape Memory Effect in a Rapidly Solidified Ni₅₁Ti₄₉ Alloy by Means of Novel Two-step Aging Treatments

Shanshan Cao, Zhi-Jie Deng, Cai-You Zeng, Ding-Xiang Wang, Zhong-Xun Zhao, Xiao Ma, Xin-Ping Zhang South China University of Technology, China

6-0233 Effect of Training on Fatigue Properties of Ni-Ti Shape Memory Alloy Microwires

Mingjiang Jin, <u>Peng Chen</u>, Xuejun Jin Shanghai Jiao Tong University, China Day 4 / March 18 (Fri)

O6. Martensitic
Transformations in
Non-ferrous Materials

O7. Martensitic Transformations
in Nano-structured Materials

10. Engineering Applications
and Devices

12. Martensite for Emerging
Structural Materials



March 18 (Friday)

10 Engineering Applications and Devices

20:40-21:40, March 18 (Friday) / KST

ZOOM 1

Chair(s) HyunWoo Jin (ExxonMobil Research & Engineering, USA)
Huilong Hou (Beihang University, China)

10-0437 Seismic Response Control of Buildings with Fe—high Mn Alloys with Dual γ/ε Phase Deformation

INVITED Microstructure

Takahiro Sawaguchi¹, Ilya Nikulin¹, Fumiyoshi Yoshinaka¹, Susumu Takamori¹, Terumi Nakamura¹, Atsumichi Kushibe², Yasuhiko Inoue², Kenji Umemura², Yuya Chiba³, Hiroaki Otsuka³

¹National Institute for Materials Science, Japan, ²Takenaka Corporation, Japan, ³Awaji-Materia Co. Ltd., Japan

10-1236 Microstructure and Mechanical Properties of Medium Carbon Martensite-bainite

INVITED Complex Phase Steels

Hong-Beom Lee, Ho Hyeong Lee, <u>Dong-Woo Suh</u> Pohang University of Science and Technology, Korea

10-1264 Martensite in Oil and Gas Industry: State-of-the-art Applications & Future Opportunities

INVITED HyunWoo Jin

ExxonMobil Research & Engineering, USA

10-0812 Vibration Damping Based on Micromachined SMA Foil Actuators

<u>Kiran Jacob</u>¹, Schuichi Miyazaki², Manfred Kohl¹

¹Karlsruhe Institute of Technology, Germany, ²University of Tsukuba, Japan

10-0691 Aging Behavior and Superelasticity of Ti-xNi-12Cu (x = 39 ~ 41 at.%) Alloys

<u>Ji Hyun Kim</u>¹, Yeonju Ryu¹, Jung Gi Kim¹, Jeong Seok Oh¹, Tae Kyung Lee², Tae Hyun Nam¹ *Gyeongsang National University, Korea,* ²*Pusan National University, Korea*

10-1755 Study of Interaction between Phase Transformation and Plasticity during Cyclic Thermomechanical Loadings in NiTi Alloys with the Help of Electric Resistivity Variation

Marcos Lopes Leal Junior^{1,2}, Laurent Pino¹, Mahmoud Barati^{3,4}, Luc Saint-Sulpice¹, Laurent Daniel^{3,4}, Shabnam Arbab Chirani¹

¹Ecole Nationale d'Ingénieurs de Brest, France, ²Université Paris-Saclay, Sorbonne Université, France, ³Université Paris-Saclay, France, ⁴Sorbonne Université, France

10-0540 Transparent and Black-monoclinic Zirconia Formed by Oxidation of Zirconium

Yuta Himeno¹, Mitsuhiro Matsuda¹, Kenji Shida¹, Motohide Matsuda¹, Yasushi Nakajima², Masahiro Itoh² Kumamoto University, Japan, ²Daiichi Kigenso Kagaku Kogyo Co. Ltd., Japan

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10 Engineering Applications and Devices

21:50-22:50, March 18 (Friday) / KST

ZOOM 1

Chair(s) Hyokyung Sung (Gyeongsang National University, Korea)

Takahiro Sawaguchi (National Institute for Materials Science, Japan)

10-1051 Development of Compression-based Elastocaloric Cooling Systems Based on Superelastic Shape

NVITED Memory Alloys

Ichiro Takeuchi University of Maryland, USA

10-0878 Fatigue-resistant High-performance Elastocaloric Materials Made by Additive Manufacturing

INVITED and Advances on Multicaloric Cooling

<u>Huilong Hou</u>^{1,2}, Emrah Simsek³, Tao Ma³, Nathan Johnson⁴, Suxin Qian⁵, Lin Zhou³, Yunho Hwang¹, Reinhard Radermacher¹, Valery Levitas³, ⁶, Matthew Kramer³, Mohsen Zaeem⁴, Aaron Stebner⁴, Ryan Ott³, Jun Cui⁶, Ichiro Takeuchi¹

¹University of Maryland, USA, ²Beihang University, China, ³Ames Laboratory, USA, ⁴Colorado School of Mines, USA, ⁵Xi'an Jiaotong University, China, ⁶Iowa State University, USA

10-1827 Operation and Simulation Elastocaloric Cooling Devices

<u>James Shen</u>, Yunho Hwang, Reinhard Radermacher, Ichiro Takeuchi *University of Maryland, College Park, USA*

10-0374 Mechanical Stability, Fatigue Life and Elastocaloric Effect of Thin-walled Ni-Ti Tubes under Compression Utilized in an Elastocaloric Regenerator

<u>Parham Kabirifar</u>¹, Luka Porenta¹, Andrej Žerovnik¹, Stefano Dall'Olio¹, Žiga Ahčin¹, Borut Žužek², Miha Brojan¹, Jaka Tušek¹

¹University of Ljubljana, Slovenia, ²Institute of Metals and Technology, Slovenia

10-0869 Thermomechanical Model of Coupled Transformation and Plasticity in NiTi Shape Memory Alloy

Petr Sedlák¹, Miroslav Frost¹, Hanuš Seiner¹, Barbora Benešová¹, Martin Kružík², Luděk Heller³, Petr Šittner³

¹Institute of Thermomechanics of the Czech Academy of Sciences, Czech Republic, ²Institute of Information Theory and Automation of the Czech Academy of Sciences, Czech Republic, ³Institute of Physics of the Czech Academy of Sciences, Czech Republic

10-0727 Prediction of Instabilities of Thin-walled Ni-Ti Tubes under Uniaxial Compression

<u>Luka Porenta</u>, Jonas Trojer, Boštjan Brank, Jaka Dujc, Miha Brojan, Jaka Tušek *University of Ljubljana, Slovenia*

10-1760 Low Cycle Fatigue Life of New Generation Endodontic Rotary Instruments - NiTi Alloys

Maha Rokbani¹, Khaled Ouiedat¹, Laurent Pino¹, Luc Saint-Sulpice¹, Marin Vincent^{2,3}, Stephane Claude³, Shabanam Arbab Chirani¹

¹ENI Brest, UMR CNRS 6027, IRDL, France, ²University of Lorraine, France, ³Colten/MigroMega, France

07 Martensitic Transformations in Nano-structured Materials

20:40-21:40, March 18 (Friday) / KST

ZOOM 2

Chair(s) Gi An Song (Kongju National University, Korea)
Manfred Kohl (Karlsruhe Institute of Technology, Germany)

7-0421 Shape Memory Nanoactuators for Photonics Applications

INVITED Manfred Kohl

Karlsruhe Institute of Technology, Germany

7-0505 Overview on Size Effects at Nanoscale in Cu-based Shape Memory Alloys: Universal Scaling Law

INVITED Jose M. San Juan¹, Jose F. Gómez-Cortés¹, Valeria Fuster^{1, 2}, Tomasz Breczewski¹, Isabel Ruíz-Larrea¹, María L. Nó¹

**Inviersidad del Pais Vasco, Spain, ²Centro Científico Tecnológico Rosario CONICET, Argentina

7-0510 On the Thermodynamics of the Martensitic Transformations in Ti-rich Ni-Ti-Co Thin Films: Frictional Work and Stored Elastic Energy

<u>Bruno Malvasio</u>, Lucio Isola, Maria Florencia Giordana, Jorge Malarria Instituto de Fisica Rosario - CONICET-UNR, Argentina

07 Martensitic Transformations in Nano-structured Materials

21:50-22:50, March 18 (Friday) / KST

ZOOM 2

Chair(s) Sung Hwan Hong (Sejong University, Korea)
Sergey Prokoshkin (National University of Science and Technology "MISIS", Russia)

7-0613 Search for Critical Austenite Grain Size Limiting Stress-Induced Transformation in Titanium Nickelide

Sergey Prokoshkin¹, Sergey Dubinskiy¹, Andrey Korotitskiy¹, Vadim Sheremetyev¹, Anton Konopatsky¹, Alexander Glezer¹, Vladimir Brailovski², Elena Blinova³, Natalya Tabachkova¹

¹National University of Science and Technology "MISiS", Russia, ²Ecole de Technologie Superieure, Canada, ³Kurdyumov Institute of Metal Science and Metal Physics, Russia

7-1791 Kinetics of Strain-induced α→ ω Phase Transformation in Diamond Anvil Cells with Different Contact Friction and the Yield Strength of ω-Zr

Feng Lin¹, Valery Levitas^{1, 2}, Krishan Pandey³, Sorb Yesudhas¹, Changyong Park⁴

¹lowa State University, USA, ²Ames Laboratory, USA, ³Bhabha Atomic Research Centre, India, ⁴Argonne National Laboratory, USA

7-1793 Plastic Strain Induced Phase Transformations in Silicon

Sorb Yesudhas¹, Feng Lin¹, Krishan Kumar Pandey², Jesse Smith³, Valery I. Levitas¹

Iowa State University, USA, ²Bhabha Atomic Research Center, India, ³Argonne National Laboratory, USA

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12 Martensite for Emerging Materials

19:30-20:30, March 18 (Friday) / KST

ZOOM 3

Chair(s) Wook Ha Ryu (Seoul National University, Korea)

Yuan Wu (University of Science and Technology Beijing, China)

12-1090 NiTi as a Means to Induce Ultra-large Elastic Strains in Other Materials

INVITED Yinong Liu¹, Junsong Zhang², Lishan Cui³, Hong Yang¹, Daqiang Jiang⁴

¹The University of Western Australia, Australia, ²Yanshan University, China, ³China University of Petroleum-Beijing, China, ⁴China University of Petroleum, China

12-1463 Development of Fatique-resistant High-Performance Elastocaloric TiCu-based Superelastic Alloys

INVITED Wook Ha Ryu^{1, 2}, Eun Soo Park

¹Seoul National University, Korea, ²Tohoku University, Japan

12-1221 New Strain-transformable Titanium Alloys Displaying Combined TRIP and TWIP Effects:

INVITED from Design Approaches to Deformation Mechanisms

Frédéric Prima

Chimie ParisTech, France

12-1162 Reinforcement of HEAs via Stress-induced Phase Transformation

INVITED Yuan

University of Science and Technology Beijing, China

12-0358 Auxetic Behavior in Single-crystalline and Texture-controlled Poly-crystalline Cu-Al-Mn-based Shape Memory Alloys

<u>Sheng Xu</u>, Xiao Xu, Toshihiro Omori, Ryosuke Kainuma Tohoku University, Japan

12-1569 Unveiling the Interplay of Deformation Mechanisms in a Metastable HEA with Synchrotron X-ray Diffraction

Shivakant Shukla¹, Jan Capek², Steven Van Petegem², Nicola Casati², Rajiv Mishra¹, <u>Efthymios Polatidis</u>²

¹University of North Texas, USA, ²Paul Scherrer Institute, Switzerland

12-1670 Enhancing Back Stress Strengthening via Precipitation and Partial Recrystallization in a Metastable High-entropy Alloy

<u>Guanghui Yang</u>, Jin-Kyung Kim *Hanyang University, Korea*

12-1410 Extreme Temperature-resistant, Ultrahigh Elastic Energy Storage in a Facilely Fabricated TiNi Strain-glass Alloy

59

Yuanchao Ji, Xiaobing Ren Xi'an Jiaotong University, China

06 Martensitic Transformations in Non-ferrous Materials

20:40-21:40, March 18 (Friday) / KST

ZOOM 3

Chair(s) Taekyung Lee (Pusan National University, Korea) Shuanglei Li (Gyeongsang National University, Korea)

6-0246 Martensitic Transformation in Ti-13Nb-13Zr Alloy for Surgical Implant Applications

INVITED Taekyung Lee¹, Jinyeong Yu¹, Sangwon Lee², Chan Hee Park²

¹Pusan National University, Korea, ²Korea Institute of Materials Science, Korea

6-1740 Coupling between Phase-Transformation and Viscoplasticity in High-temperature Shape Memory Alloys

<u>Pawan Chaugule</u>¹, Othmane Benafan², Jean-Briac Le Graverend¹ ¹Texas A&M University, USA, ²NASA Glenn Research Center, USA

6-1352 Strain Glass in Ni-rich Ni-Ti-Zr High Temperature Shape Memory Alloys

Shoukai Xu¹, <u>Jaume Pons</u>¹, Ruben Santamarta¹, Ibrahim Karaman², Othmane Benafan³, Ron D. Noebe³

**University of the Balearic Islands, Spain, **Texas A&M University, USA, **NASA Glenn Research Center, USA

6-0683 Highly Porous Ni-free Ti-Zr-based Alloy Scaffolds with Superelasticity for Biomedical Applications

Shuanglei Li¹, Jung Gi Kim¹, Jeong Seok Oh¹, Tae Kyung Lee², Mi-Seon Choi³, Yeon-Wook Kim⁴, Tae-Hyun Nam¹ ¹ Gyeongsang National University, Korea, ² Pusan National University, Korea, ³ Research Institute of Industrial Science and Technology, Korea, ⁴ Keimyung University, Korea

6-1687 Martensitic Transformations in Ti-Nb-Zr-O Alloys: On the Role of Nb and O

Kleanny Gama Sales de Souza¹, Thomas Lundin Christiansen¹, Karen Pantleon¹, Rubens Caram², Matteo Villa¹

Technical University of Denmark, Denmark, Pantleon², Pantleon³, Rubens Caram², Matteo Villa¹

6-1387 Comparative Study on the Transformation Behavior of (Ti_{43.75}V_{6.25})Pt and Ti(Pt_{43.75}V_{6.25}) Ternary Alloys

<u>Pfarelo Daswa</u>¹, Malesela (Linda) Mahlatji¹, Silethelwe Chikosha¹, Charles Siyasiya² ¹Council for Scientific and Industrial Research, South Africa, ²University of Pretoria, South Africa

06 Martensitic Transformations in Non-ferrous Materials

21:50-22:50, March 18 (Friday) / KST

ZOOM 3

Chair(s) Jung Gi Kim (Gyeongsang National University, Korea) Chih-Hsuan Chen (National Taiwan University, Taiwan)

6-1602 Effects of Alloying Ni-Mn-Ga High Temperature Shape Memory Alloy with Hf or Zr

Shoukai Xu, Jaume Pons, Ruben Santamarta University of the Balearic Islands, Spain

6-0720 Enhancement of Superelasticity in Mg-Sc Shape Memory Alloy by Microstructure Control

<u>Keisuke Yamagishi</u>, Daisuke Ando, Yuji Sutou *Tohoku University, Japan*

6-0186 Deformation Studies of Mg-PSZ Under Compressive Loading

<u>Trevor Finlayson</u>¹, George Franks¹, Erich Kisi², Mitchell Sesso³, Martin Stuart⁴

¹The University of Melbourne, Australia, ²The University of Newcastle, Australia, ³La Trobe University, Australia, ⁴Morgan Technical Ceramics Pty., Ltd., Australia

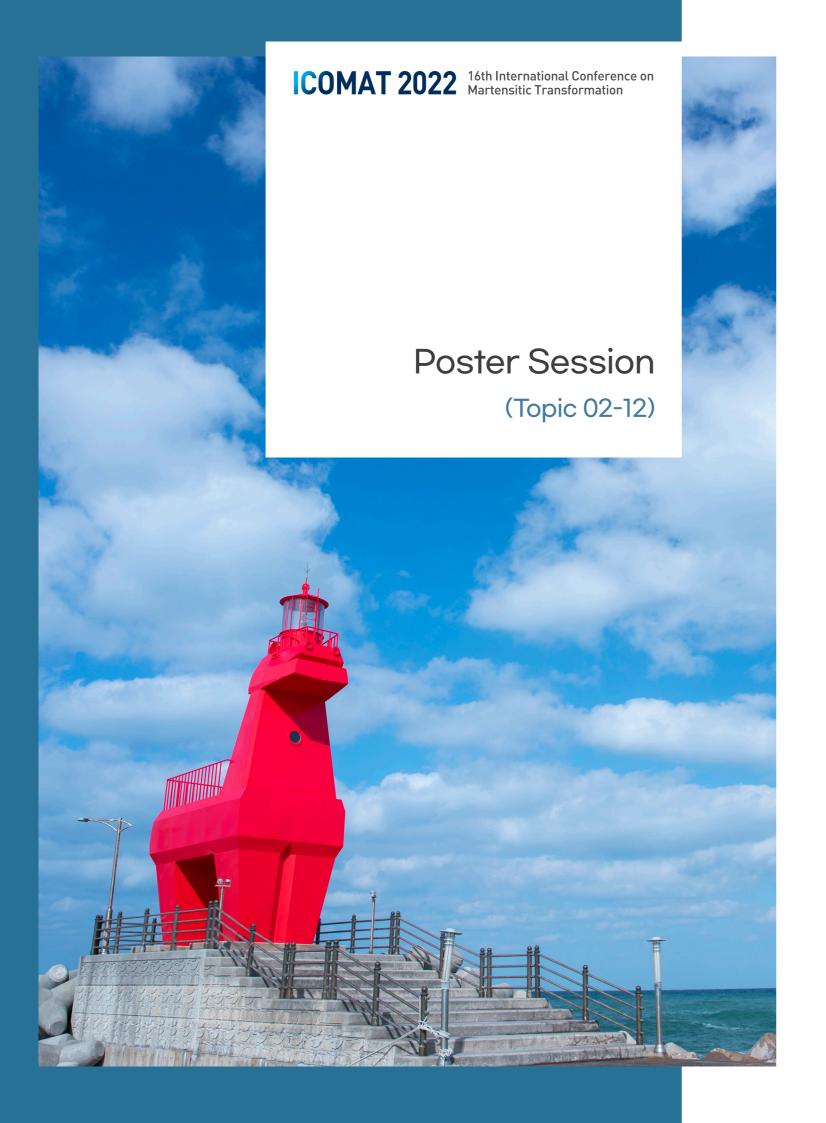
6-0191 Superelastic Cycling at Small-scale in Cu-Al-Mn Shape Memory Alloy Micropillars

Mostafa Karami¹, Nobumichi Tamura², Xian Chen¹

¹Hong Kong University of Science and Technology, Hong Kong, ²Lawrence Berkeley National Laboratory, USA

6-0237 Cellular Microstructures in Mn_{55.2}Ga_{19.0}Cu_{25.8} Ferromagnetic Alloy

Yasukazu Murakami¹, Youngji Cho¹, Ryosuke Kainuma² ¹Kyushu University, Japan, ²Tohoku University, Japan



Poster Session

02 Theoretical Approaches to Martensitic Transformation

2-0953 Incompatibility and Energy Barrier of Martensite in the Initial Stage Martensitic Transformation in B19'TiNi Shape Memory Alloy

<u>Takeshi Teramoto</u>, Kazuya Nagahira, Katsushi Tanaka Kobe University, Japan

2-1108 Ginzburg-Landau Modeling for Martensitic Transformation Coupled with Composition Redistribution and Edge Dislocation Evolution

Guanglong Xu, Yuwen Cui Nanjing Tech University, China

03 Martensitic Transformation in Steels

3-1526 The Influence of Chemical Heterogeneity on Microstructure and Tensile Properties of Martensitic Steel

<u>Ji Hoon Kim</u>¹, Guiyoung Gu¹, Minseo Koo², Eun-Young Kim², Jae-Sang Lee¹, Dong-Woo Suh¹ ¹Pohang University of Science and Technology, Korea, ²POSCO, Korea

3-1690 Microstructural Characterization of Induction Hardened Surface Layer of an AISI 4340 Forging Steel Sujin Jeong, Eunah Kim, Singon Kang

Dong-A University, Korea

3-1813 Phase Transformations and Texture Development during Cold Rolling and Quenching of Austenitic Steel

Roman Minushkin, Olga Krymskaya, Margarita Isaenkova, Vladimir Fesenko National Research Nuclear University MEPhl, Russia

04 Novel Shape Memory Alloys

I-0703 TiNi-Based Multi-component High-temperature Shape Memory Alloys

<u>Izaz Ur Rehman</u>¹, Jung Gi Kim¹, Jeong Seok Oh¹, Tae Kyung Lee², Mi-Seon Choi³, Yeon-wook Kim⁴, Tae-hyun Nam¹ ¹Gyeongsang National University, Korea, ²Pusan National University, Korea, ³Research Institute of Industrial Science and Technology, Korea, ⁴Keimyung University, Korea

4-0750 The Study of Reversible Martensitic Transformations in Superelastic Ti-Zr-Nb-based Alloys

Mariia Zaripova, Margarita Isaenkova, Vladimir Fesenko, Olga Krymskaya, Ilya Kozlov, Andrey Osintsev, Ilya Kozlov

National Research Nuclear University MEPhl, Russia

4-1598 From RVE to 3D Stochastic Modeling of NiTi SMA

<u>Marie Caruel</u>¹, Karine Lavernhe-Taillard¹, Olivier Hubert¹, Carlos Angelo Nunes², Etienne Patoor³, Pascal Laheurte³

**IENS Paris-Saclay, France, **University of Sao Paulo, Brazil, **Georgia Tech Lorraine, France

4-1640 Characteristics of Shape Memory Behavior of Ti-Ni Alloys by Addition of Co and O

Nayoung Geum, Jeail Kim Dong-a University, Korea

4-1658 Microstructure and Properties of Quaternary Cu-Al-Ni-X SMA

<u>Mikel Pérez-Cerrato</u>, José Fernando Gómez-Cortés, Isabel Ruiz-Larrea, Tomasz Breczewski, Maria Luisa Nó, José María San Juan

University of the Basque Country UPV/EHU, Spain

05 Magnetic Shape Memory Alloys

5-0268 Damping Characteristics of Ni-Mn-Sn Shape Memory Alloys

Yuan-Hsuan Chang¹, Chin Kuo¹, Shih-Hang Chang¹, Shyi-Kaan Wu², Chieh Lin²

¹National Ilan University, Taiwan, ²National Taiwan University, Taiwan

5-0625 Evidence for the Precursor State of the Premartensite Phase in Ni₂MnGa Magnetic Shape Memory Alloy by Atomic Pair Distribution Function Study

<u>Anupam Kumar Singh</u>, Sanjay Singh, Dhananjai Pandey *Indian Institute of Technology (BHU), Varanasi, India*

5-1281 Low-pressure-induced Giant Barocaloric Effect in Ni_{35.5}Co_{14.5}Mn₃₅Ti₁₅ all-d-metal Heusler Ferromagnetic Shape Memory Alloy

Zhiyang Wei¹, Yi Shen¹, Bing Li², Enke Liu³, Jian Liu⁴

¹Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, China, ²Institute of Metal Research, Chinese Academy of Sciences, China, ³Institute of Physics, Chinese Academy of Sciences, China, ⁴Ningbo Institute of Materials Technology and Engineering, China

5-1728 Open Die Pressing Sintering of NiMnGa-based Alloys: A Route towards the Microstructure Optimization for Magneto-Mechanical Coupling

<u>Francesca Villa</u>¹, Franca Albertini², Mauro Coduri³, Carlo Fanciulli¹, Roberto Frigerio⁴, Andrea Morlotti⁴, Adelaide Nespoli¹, Francesca Passaretti¹, Corrado Tomasi¹, Elena Villa¹

¹CNR Institute of Condensed Matter Chemistry and Technologies for Energy, Italy, ²CNR Institute of Materials for Electronics and Magnetism, Italy, ³University of Pavia, Italy, ⁴University of Milano-Bicocca, Italy

06 Martensitic Transformations in Non-ferrous Materials

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6-0352 Martensitic Transformation Strain Field and Elastocaloric Effect in Cu-Al-Mn Single Crystal

<u>Nian-Hu Lu</u>, Chih-Hsuan Chen *National Taiwan University, Taiwan*

6-0370 Strain Variation during the B2 → B19' Martensitic Transformation in Quenched Ni₅₁Ti₄₉ Shape Memory Alloy during the Isothermal Holding under the Stress

Aleksei Ivanov¹, Artur Gabrielian¹, Sergey Belyaev¹, Natalia Resnina¹, Vladimir Andreev²

¹Saint-Petersburg State University, Russia, ²Baikov Institute of Metallurgy and Materials Science, Russia

6-1341 Effect of Microstructure on Mechanical Properties of Hot-rolled Ti-6Al-4V Alloy Plate

<u>Seongwoo Choi</u>¹, Jae H. Kim¹, Sang-Won Lee¹, Chan Hee Park¹, Jong-Taek Yeom¹, Yoon Suk Choi², Jae-Keun Hong¹

¹Korea Institute of Materials Science, Korea, ²Pusan National University, Korea

6-1626 Martensitic Transformation in Equiatomic NiZr Alloy

Koki Onaka, Mitsuhiro Matsuda Kumamoto University, Japan

6-1785 Thermo-mechanical and Microstructual Characteristics in aged CuAlNi Alloys

Micaela Mosquera Panizo¹, Fran De Castro Bubani^{2,3}, Eugenia Zelaya², Adriana Condo^{2,3}, Rosana Gastien¹

UNIDEF, CITEDEF-CONICET, Argentina, ²Centro Atómico Bariloche, Argentina, ³Universidad Nacional de Cuyo, Argentina

07 Martensitic Transformations in Nano-structured Materials

7-0309 Processing Routes and Manganese Content Effect on the Martensite Transformation and Mechanical Properties of Pre-alloyed ODS Steels

Andrews Nsiah Ashong¹, Jeoung Han Kim¹, Giseung Shin¹, Sang Hoon Noh² ¹Hanbat National University, Korea, ²Korea Atomic Energy Research Institute, Korea

7-1295 Properties of Nano-Grained NiTi Alloys Manufactured without Severe Plastic Deformation

<u>Seung Won Kang</u>¹, Jong Taek Yeom¹, Jae Ho Kim¹, Chan Hee Park¹, Seong Woo Choi¹, Sang Won Lee¹, Jae Keun Hong¹, Jeung Won Jo², Ji-Tae Park², Soon Tae Ahn²

¹Korea Institute of Materials Science, Korea, ²Samhwa steel, Korea

7-1716 Martensitic Transformations in Nanocrystalline Shape Memory NiTi Wires

Elizaveta laparova¹, Ondřej Tyc^{1,2}, Lukáš Kadeřávek^{1,2}, Luděk Heller^{1,3}, Petr Šittner^{1,3}

¹Institute of Physics of the Czech Academy of Sciences, Czech Republic, ²The Czech Technical University in Prague, Czech Republic, ³Nuclear Physics Institute of the Czech Academy of Sciences, Czech Republic

08 Novel Characterization of Martensite

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8-0482 Characterization of Dislocation Substructures and Detection of Residual Strain Induced by Thermoelastic Martensitic Transformation in Ti-Ni Based Alloys

Akira Heima¹, Takumi Higashizono², Ryosuke Nishikawa², Hiroshi Akamine², Tomonari Inamura¹, Minoru Nishida²

¹Tokyo Institute of Technology, Japan, ²Kyushu University, Japan

Landau-Energy Landscape Reconstruction for a Ni-Fe-Ga(Co) Shape Memory Alloy

<u>Kristyna Zoubkova</u>^{1, 2}, Petr Sedlak², Elena Villa³, Masaki Tahara⁴, Hideki Hosoda⁴, Volodymyr Chernenko^{4, 5}, Hanus Seiner²

¹Czech Technical University in Praque, Czech Republic, ²Institute of Thermomechanics, Czech Academy of Sciences, Czech Republic, ³Institute of Condensed Matter Chemistry and Technologies for Energy, Italy, ⁴Tokyo Institute of Technology Institute of Innovative Research, Japan, ⁵BCMaterials & University of Basque Country, Spain

09 Advanced Processing Techniques

9-0385 Omega Phase Formation in Lath Martensite Structure Fabricated by Additive Manufacturing

Marzieh Ebrahimian¹, Mahdi Aghaahmadi¹, Giseung Shin^{1,2}, Haneul Choi³, Hye Jung Chang³, Ji Hyun Yoon⁴, Yongho Park², Jeoung Han Kim¹

¹Hanbat National University, Korea, ²Pusan National University, Korea, ³Korea Institute of Science and Technology, Korea, ⁴Korea Atomic Energy Research Institute, Korea

Functional Behaviour of the NiTi Samples Produced by Wire-Arc Additive Manufacturing

Rashid Bikbaev¹, I.A. Palani², Natalia Resnina¹, Sergey Belyaev¹, S. S. Mani Prabu², M. Manikandan², S. Jayachandran², S. Anshu², Uliana Karaseva¹

¹Saint-Petersburg State University, Russia, ²Indian Institute of Technology Indore, India

9-1190 Accelerated Formation of an Ultrafine-grained Structure in a Two-phase Ti Alloy during Compression with Decreasing Temperatures

<u>Jeongmok Oh</u>¹, Jae-Keun Hong¹, Jong-Taek Yeom¹, Sang Won Lee¹, Eun-Young Kim¹, Namhyun Kang²,

¹Korea Institute of Materials Science, Korea, ²Pusan National University, Korea

9-1366 Fatigue Crack Growth Behavior of CoCrFeMnNi High-entropy Alloy at Ambient and Cryogenic **Temperature**

Haeum Park¹, Sangeun Park¹, Saif Haider Kayani¹, Im doo Jung², Seok Su Sohn³, Hyokyung Sung¹ ¹Gyeongsang National University, Korea, ²Ulsan National Institute of Science and Technology, Korea, ³Korea University, Korea

9-1372 Grain Size Dependency on Tensile and Fatigue Crack Growth Behavior of High-entropy Alloys

<u>Jae Hoon An</u>¹, Tae Hyeong Yeo¹, Sangeun Park¹, Jong Woo Won², Young Hee Jo², Hyokyung Sung¹ ¹Gyeongsang National University, Korea, ²Korea Institute of Materials Science, Korea

9-1488 Hot Deformation Behavior and Processing Map of Wire and Arc Additive Manufactured Ti-6Al-4V Alloy

Anoop Kumar Maurya¹, P.L. Narayana¹, Seung won Kang¹, Jong Taek Yeom¹, Jae-Keun Hong¹, Chan-Hee Park¹, Jae-ho Kim¹, N.S. Reddy²

¹Korea Institute of Materials Science, Korea, ²Gyeongsang National University, Korea

9-1829 Martensitic Transformation in Additive Manufactured Shape Memory Steels

Lucia Del-Río¹, Maria L. Nó¹, Angel Sota^{2, 3}, F. Garciandia⁴, Mikel Pérez-Cerrato¹, Iñigo Perez-Casero², A.M. Mancisidor⁴, Angela Veiga^{2, 3}, Maria San Sebastian⁴, Sergio Ausejo^{2, 3}, Nerea Burgos^{2, 3}, Jose M. San Juan¹ ¹University of the Basque Country UPV/EHU, Spain, ²CEIT-Basque Research and Technology Alliance, Spain, 3 Universidad de Navarra, Tecnun, Spain, 4 LORTEK S. Coop-Basque Research and Technology Alliance, Spain

Manufacture of Spherical Ti-48Zr-8Nb-2Sn Alloy Powders for Biomedical Applications by RF **Plasma Processing**

Miseon Choi, Eonbyeong Park Research Institute of Industrial Science and Technology, Korea

10 Engineering Applications and Devices

10-0717 Effect of Thermo-mechanical Treatment on Martensitic Transformation and Superelastic Behavior of Ti-49.5Ni-15Hf-3Nb(at. %) Alloy

<u>Jin Hwan Lim</u>¹, Tae Kyung Lee², Jung Gi Kim¹, Jeong Seok Oh¹, Tae-Hyun Nam¹ ¹Gyeongsang National University, Korea, ²Pusan National University, Korea

10-1146 Electrochemical Properties of Thin Film Si Anode Deposited on Ti-Nb-Zr Shape Memory Alloys in Li-ion Battery

<u>Junseok Lee</u>, Joohyeon Bae, Duckhyeon Seo, Taehyun Nam, Jungpil Noh Gyeongsang National University, Korea

10-1631 Grain Size Effect on Large-Strain Superelastic Axial-Bending in Cu-Al-Mn Shape Memory Alloy

Rina Matsueda¹, Hirobumi Tobe², Sota Oshima¹, Eiichi Sato², Koichi Kitazono¹

¹Tokyo Metropolitan University, Japan, ²Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency, Japan

11 Biomedical Applications and Devices

11-1154 Shape Memory Characteristics of Porous Ti-Zr-Mo-Sn Scaffolds

Yeon-Wook Kim Keimyung University, Korea

12 Martensite for Emerging Materials

12-0382 Probing the Martensite transition and thermoelectric properties of Co xTaZ(x=1,2:Z=Si,Ge,Sn)

Rajeev Dutt^{1,2}, Aparna Chakrabarti^{1,2}, Dhanshree Pandey^{1,2}

¹Homi Bhabha National Institute, India, ²Raja Ramanna Centre of Advanced Technology, India

12-1665 The Effect of Grain Refinement on Deformation Mechanisms and Mechanical Properties of Fe50Mn30Co10Cr10 HEA

Jin-Seob Kim, Jin-Kyung Kim Hanyang University, Korea

Company Profile

◆ Company Information



Name of company	HANSCO		
Hompage	www.hansco.kr		
Address	35, Munpyeongseo-ro 17beon-gil, Deadeok-gu, Daejeon, Republic of Korea		
Tel	+82-42-931-6300	Fax	+82-42-931-6304

VAR (Vacuum Arc Remelting)

◆ Section 1. Advanced Material Business







Ni- Base	Classifi cation	Inconel 713C, Inconel 600, Inconel 625, Inconel 718, Hastelloy C276
Super Alloy		Ф80×1000,
	Ingot	Ф100×1000,
	size	Ф360×1000,
		Ф450×750
		C.P Titanium
	Classifi	(Gr. 1,2,3,4)
	cation	Titanium Alloy
	(Gr. 5,7,9,12,23, etc)	
Ti		Ф360×1400,
Alloy		Ф450×1400,
	Crucible	Ф450×2100,
	size	Ф520×2100,
		Ф160×1400,
		Ф280×2100

Description	Capacity	Description	Capacity
VAR (Vacuum Arc Remelting)	1Ton 3Unit, 1.5Ton 2Unit	VIM (Vacuum Induction Melting)	1Ton 1Unit, 25Kg 1Unit
Hydraulic Press	2000Ton for Ti sponge compress 1Unit	Hydraulic Free Forging Press	500Ton 1Unit, 2500Ton 1Unit
Electric Furnace	1 Unit	Heat Treatment Furnace	1 Unit

◆ Section 2. Plant Business









Rare Metals (Ti/Zr/Co/Nb/Ni Alloy) Recycling and Material Manufacturing Company

Name	Dong-A Special Metal Co.,LTD.			
Office	129, Jungnisanggok-ro, Naeseo-eup, Masanhoewon-gu, Changwon-si, Gyeongsangnam-do, Korea	Daesan Factory	769-37, Songsan-ro, Daesan-myeon, Haman-gun, Gyeongsangnam-do, Korea	
	Tel) +82-55-585-7396 Fax) +82-55-586-7393	Gyeongsan	1240, Daehak-ri, Hayang-eup, Gyeongsan-si,	
	1 F00 40 1 1 1 D	-,		

Ham-an | 528-16, Jangbaek-ro, Beopsu-myeon, Haman-gun, Factory

Gyeongsangnam-do, Korea

Titanium Sponge(Cobble)

Dong-A produces a sponge cobble that can be used as a raw material instead of the Ti sponge for titanium manufacturing or Steel Making. We are selling to domestic, overseas steel makers and Ti manufacturer.





<Ti Cobble>



<Ti Cobble Puck>



Specification O: 0.10 ~ 0.25 % N: 0.017 ~ 0.025 % C: 0.01 ~ 0.08 % H: 0.005 ~ 0.01 % Fe: 0.2 ~ 0.4 % Ti:99.0 ~ 99.2 %

Gyeongsangbuk-do, Korea

Vacuum Precision Casting

<Ti Sponge>

Dong-A introduced ISM (Induction Skull Melting) equipment for the first time in Korea for producing the precision castings, and These productions are for defense, aviation, automobile, medical, etc.







<CoCr Artificial Joint>



<ISM Equipment>

Ferro-Titanium

Dong-A is only producer of ferrotitanium alloy in Korea. Only 68~72% Ti is currently being produced, and the target is 3,000MT/year. We can produce specifications that meet the needs of users, and we are doing our best for quality.







					.,
Product	Ti	С	N	Al	L V
STD.1	68~72	0.15	0.5		
STD.2	68~72	0.15	0.5	5.0	3.0

<Melting and Ingot>

<5~50mm Size>

<Fe-Ti Powder>

<Specification>

Alloying Materials / 3D Metal Printing Powder

Dong-A is on sales the feed stocks for various rare metal manufacturing, and can produce the 3D Metal printing powder (Ni, Co, Ti alloy)









<Ti, Ni, Co, Zr, Nb alloy Feed Stocks>

<3D Metal Printing Powder>

프리미엄 아파트의 새로운 기준,

지진은 물론 강풍, 저온에도 강하게 어떤 상황에도 쓰러지지 않고 안전을 지킬 때 비로소 프리미엄 아파트는 완성됩니다. 더 안전하고 더 단단하게 HCORE(에이치코어)가 새로운 기준을 만들어갑니다.



현대제철 건축강재 H((CORE



METALLURGY HANKOOK VACUUM

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첨만금속

특수금속

스퍼터링 타겟









발전소



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