YOUNGSTOWN STATE UNIVERSITY

2018 TIME

Technological Innovation in Metals Engineering

TECHNION Israel Institute of Technology

Technological Innovation in METALS ENGINEERING

May 30th – 31st, 2018

Haifa International Congress Center (ICC), Israel

www.tms.org/time2018

(Version date : April 16th 2018)

To increase the impact of global RTD efforts the TIME event is set to bridge industrial demand and technological supply in the field of metal technologies. The TIME events are set to be bi-annual events in which a discussion between industrial, governmental and innovative technological sectors is promoted.

TIME2018 is co-organized by Youngstown state university (Ohio, USA) and the Technion – Israel institute of technology (Haifa, Israel). It incorporates global experts from industrial related metals innovation and is a two days event (May 30th-31st 2018). The first day is set to emphasize the industrial needs from the upcoming metal technologies (materials and processes) and the second one will showcase the upcoming technologies from the RTD sector.

The Chairman of TIME2018 is Distinguished Prof. Emeritus Dan Shechtman, 2011 (chemistry) noble laurate and the event is sponsored by the TMS* organization.

Though heavily industry-oriented in its nature, the event welcomes anyone whose work interests involves metal developments at high maturity of Technology Readiness Levels (TRL)** 4-9.

The purposes of this event are:

a. Screen and review the modern challenges in the current and near future markets applications.
b. Introducing engineers to the latest applicative developments which can be likely to be seen in the manufacturing companies in the upcoming years.
c. Providing a market review and trends for different technological markets.
d. Creating a platform for industrial cooperation, R&D collaboration and knowledge exchange.
e. Introduce activities and capabilities of innovative companies and research institutes in the field.
f. Hold a thematic open discussion forum for increased networking of participants.

This symposium aims to bring together experts from industry, academia, and government. The intent is to bring attention to industrial innovations, mega-trends impacting the metals industry, emerging technologies that could advance or disrupt the metals industry. Key topics of interest for TIME2018 are:

1.) Additive manufacturing
2.) Alloys and critical materials
3.) Metals processing through shaping, forming, and solidification (including “Advanced manufacturing in metal processing” experts panel)
4.) Applications

Please consider yourself invited to explore the attached agenda and join us at the event to discuss upcoming industrial technologies and trend in the metals industries.

Committee Members:

- Iver Andersen, Ames Laboratory
- Norbert Babcsan, Aluinvent Zrt
- Raj Banerjee, University of North Texas
- Menachem Bamberger, Technion, Israel Institute of Technology
- Warren Bath, TWI
- Dennis Butcher, U.S. Air Force Research Laboratory
- Brett Conner, Youngstown State University (Co-organization party)
- Santiago Cuesta Lopez, ICAMCyL Foundation: International Research Center in Advanced Materials and Raw Materials
- Narendra Dahotre, University of North Texas
- Noam Eliaz, Tel Aviv University
- Shai Essel, Technion Israel Institute of Metals (Co-organization party)
- Nahum Frage, Ben Gurion University
- Dirk Landgrebe, Fraunhofer Institute Forging Technology and Tool Machine (IWU) Chemnitz
- Gideon Levy, Technology Turn Around, CIRP Fellow
- Sarang Pande, Marwadi University
- Timotius Pasang, Auckland University of Technology,
- Maria Letizia Ruello, Università Politecnica delle Marche
- Peter Sachsenmeier, VP Hankou University
- Virgil Solomon, Youngstown State University
- A. Erman Tekkaya, TU Dortmund
- Ivan Todaro, University of Bologna
- Rafi Wertheim, TU Chemnitz Fraunhofer Institute
- Henning Zeidler, Technische Universität Bergkademie Freiberg

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Notable speakers:

Prof. Dan Shechtman (**TIME2018 Chairman**) - Professor of Materials Science at the Technion – Israel Institute of Technology, an Associate of the US Department of Energy's Ames Laboratory, and Professor of Materials Science at Iowa State University. Awarded the 2011 Nobel Prize in Chemistry for the discovery of quasicrystals.

Dr. Terry Wohlers - Industry consultant, analyst, author, and speaker Terry Wohlers is president of Wohlers Associates, Inc., an independent consulting firm he founded 31 years ago. He is a principal author of the recently published Wohlers Report 2018, the undisputed industry-leading report on additive manufacturing and 3D printing for 23 consecutive years.

Prof. Dr. Gideon N. Levy - Prof. Levy's career has been mainly in advanced R&D in Mechanical / Electronic world with leading Swiss machinery industries. Specializing in Manufacturing technologies, Technology management, Market - Product strategies, key customers, industrial, scientific, technical and practical aspects of product design and advanced manufacture, market launch and technology transfer.

Prof. Brett Conner (**TIME2018 co-organization**) - Director of Advanced Manufacturing Research Center and Associate Professor of Manufacturing Engineering at Youngstown State University. Dr. Conner is the Director of the Consortium for Advanced Hybrid Manufacturing – Integrating Technologies.

Prof. Dr.-Ing. Andreas Schubert - Prof. Dr.-Ing. Andreas Schubert – Head of Professorship Micromanufacturing Technology at Chemnitz University of Technology. Experienced in Technology and Knowledge Transfer. Head of Competence Center Micromanufacturing and Surface Technologies – KoMOT at the Fraunhofer Institute Machine Tools and Forming Technology.

Eng. Rob Gorham - joined the America Makes team in 2013 as the Deputy Director of Technology Development and in May 2014 was promoted to Director of Operations. In May 2017, Rob was promoted to Executive Director of America Makes. He has more than a decade of solid defense research and advanced manufacturing experience.

Dr. Alex King – Dr. Alex King's research focuses today on a broad range of issues related to the supply chains of critical elements for clean energy technologies, but he has also worked in the modeling and characterization of materials – and particularly their interfaces and interfacial junctions – for a diverse range of applications ranging from nuclear reactors to microelectronics.

Dr. Santiago Cuesta-López – GENERAL MANAGER of ICAMCyL Foundation, International Center for Advanced Materials and Raw Materials of Castilla y Leon. A European level expert in the field of critical raw materials, nuclear science and materials science. Representing Spain as member state in the Operational Groups of the European Innovation Partnership in Raw Materials. Executive member of EU NANOFUTURES as chairman of the Working Group on Critical Raw Materials. member of the strategic group in M-ERANET. Executive member of EU-Nanosafety cluster. Liaison Officer for the Nuclear Energy Agency (NEA-OECD).

Prof. Dr.-Ing Henning Zeidler – Heading the Additive Manufacturing professorship at TUBA Freiberg. Chairman of the Board of Beckmann-Institute for Technology Development (BTE). Former Chief Executive Engineer at the micro manufacturing professorship at TU Chemnitz, Prof. Zeidler is teaching at TUBA Freiberg, an independent entrepreneur and winner of multiple EC grants.

Univ.-Prof. Dr. Leopold Weber – Former head of the Department of Geosciences and Geotechnical Engineering (today Department of Raw Materials) of the Austrian Federal Ministry for Economy, Univ. Prof. of the University of Vienna. Former Austrian representative of the Raw Minerals Supply Group in Brussels and member of the EC critical minerals ad hoc working group. Prof. Weber is co-editor and co-author of the annual World Mining Data, the Metallogenetic Map of Austria, the Handbook of Mineral Deposits, Industrial Minerals and Energy Resources of Austria the Austrian Resource Information System IRIS and the Austrian Mineral Resources plan. Amongst high level awards he was awarded with the Serge von Bubnoff Medal for his work.

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Preliminary Schedule

May 29th 2018

18:00 Welcome reception at Technion (Casual dress code)

May 30th 2018:

8:00	**Registration**				
9:00	Opening & welcome: Dr. Amiram Appelbaum, Chief scientists and chairperson, Israeli Innovation Authority. Prof. Peretz Lavie, Technion president. Dr. Martin Abraham. Provost. Youngstown State University Mr. Shraga Brosh, Israeli Industry Association (IIA) president Mr. Yona Yahav, Haifa city mayor				
9:30	Welcome + plenary Session #1 – Prof. Dan Shechtman				
10:00	Coffee break				
	Parallel Sessions – Industrial Innovations				
	Additive Manufacturing I - New material and process development	**Metals processing I -**	**Alloys and Critical Metals I -**	**Applications I**	**Additive manufacturing II - Emerging Technologies**
Chair	Levy, Gideon	Pasang, Timotius	Anderson, Iver	Babscan, Norbert	Dahotre, Narendra
10:30	A1 - Invited: State-of-the-art and Experiences of New Material and Process Development for EBM - Koptyug, Andrey	B1 – invited - Laser and Electron Beam Welding of Additive Manufactured and Conventional Ti-6Al-4V Parts - Shirizly, Amnon	C1 – Invited: Review of goals and results of Horizon2020 NOVAMAG project - Development of non-rare-earth and rare-earth-lean permanent magnets – Popov, Vladimir	D5 - Invited: Titanium in Chemical Industries and Medical Applications: Laboratory Research and Industrial Performance - Schorr, Michael	E1- Invited: UAM Solid-state additive manufacturing and post-processing of the Al/Ti system - Aslan Miriyev

11:00	A2 - Real-time monitoring of AM process with EOSTATE OT and MPM-Milovanov, Vyacheslav	B2 - Influence of Shielding Gas Composition on Microstructure and Mechanical Properties of Wire and Arc Additive Manufactured Inconel 625 - Bušić, Matija	C2 – Accelerated Development of Substitutes for Rare-Earth Permanent Magnets - Lograsso, Thomas	D2 - Studying the Combinatorial Effect of Platinum Group Metals and Rare Earths for Catalytic Performance Enhancing for Automotive Applications - Yakoumis, Iakovos	E2 - Material Developments in Binder Jet 3D Printing - Klein, Andrew
11:20	A3 - Advanced Manufacturing of Near-Net-Shape Parts from Functional Materials: 3D Printing of Porous Ni-Mn-Ga Magnetic Shape Memory Alloys - Virgil Solomon	B3 - Joining of Additive Manufactured Components by Arc Welding - Addison, Adrian	C3 - Facts and Myths of Niobium Recycling - Bartl, Andreas	D3 - Mixed Light Inspection: A Novel Technique to Enhance Fluorescent Dye and Magnetic Particle Inspections – Diamond, Geoff	E3 - Lithography-based Additive Manufacturing of Metal-based Suspensions - Mitteramskogler, Gerald
11:40	A4 - 3D Printing of Fe77Ni5.5Co5.5Zr7B4Cu1 High Temperature Magnetic Powders - Virgil Solomon	B4 - Mechanical Properties of EB-welded AM-SLM AlSi10Mg Alloy - Nahmany, Moshe	C4 - Microstructure and Sliding Wear Performance of Cr7C3-(Ni,Cr)3(Al,Cr) Coating Deposited from Cr7C3 In Situ Formed Atomized Powder - Zhu, Hongbin	D4 - Perspectives of XCT for Nondestructive Studying of Metallic Micro and Nano Structures - Zschech, Ehrenfried	E4 - Metals Additive Manufacturing from High-end Technology to Commodity - Madow, Jeremy
12:00	Lunch				
13:15	Plenary session #2 – Dr. Terry Wohlers – The future of Metal Additive Manufacturing				

13:45	plenary Session #3 – Prof. Gideon Levy - Additive Manufacturing - The Enabling Space for Future Innovation Game-Changing recent achievements and emphases.				
14:15	Open discussion (Panel) – additive manufacturing current state and future challenges (Rob Gorham , Prof. Gideon Levy, Prof. Brett Conner, Haim Rosenson, Dr. Terry Wohlers) Moderator Prof. Zeidler TUBAF				
15:00	Coffee break				
	Parallel Sessions – Industrial Innovations				
	Additive Manufacturing III - Directed energy deposition	**Metals processing II -**	**Alloys and Critical Metals II**	**Applications** II	**Additive Manufacturing IV – AM Applications and Technology**
Chair	Todaro, Ivan	Sachsenmeier, Peter	Grilli, Maria Luisa	Zeidler, Henning	Rosenson, Haim
15:30	A5 – Invited: Microstructural Evolution and Defect Control in Al-Si-Mg Components Fabricated via Directed Energy Deposition (DED) - Eliaz, Noam	B5 – Invited: Improvements in Welding Properties through the Use of Interlayer - Pasang, Timotius	C5 – Invited: Lithium as a A key Actor in Globally Decarbonized Mobility/electronics and Future Energy Marked: A Circular Economy Assessment - Iglesias, Roberto	D5 – Invited: Closed Cell Aluminium Foam Applications - Babcsan, Norbert	E5 - Invited: Additive Manufacturing of Ti6Al4V (ELI) Medical Implants - du Preez, Willie
16:00	A6 – Multi-Materials and Multi-Functionality Enabled by Hybrid Additive Manufacturing - Brett Conner	B6 - Wear Properties of Friction Stir Processed Aluminium-Magnesium Alloy - Balos, Sebastian	C6 - Mechanical Processing of Li-Ion Batteries - Borsdorff, Dennis	D6 - Comparison of Various Properties of Ti Alloys for Implant Making - Soni, Raj	E6 - Application of Additive Manufacturing for Veterinary Medical Implants - Muller, Gary
16:20	A7 - A Comparative Study of Laser Surface Melted and LENSTM Deposited Gray Cast Iron - Rajarshi Banerjee	B7 - Weldability of Austenitic Stainless Steels with Filler Materials Containing Different	C7 - Graphene as an Effective Support for Nickel Nanoparticles as a Catalyst for Methanol	D7 - Influence of Low Temperature on Impact Energy and Microstructure of Unalloyed	E7 - Laser Additive Processing of a Functionally Graded Internal Fracture Fixation Plate - Mantri, Srinivas Aditya

		Percentages of Alloying Elements - Bušić, Matija	Electro-oxidation in Alkaline Medium - Kadirgan, Figen	ADI Material - Rajnovic, Dragan	
16:40	A8 – **TBC (GE topic under evaluation)**	B8 – Manufacturing of Functionalized Surfaces for Influencing the Tribological Behavior of Metallic Parts by Cutting Operations – Schubert , Andreas	C8 - Nickel Oxide Functionalized Graphene Oxide – Polyacrylamide Nanocomposites - Kadirgan, Figen	D8 - Heat Treated Cast Iron as Ballistic Protection - Balos, Sebastian	E8 - 3D Bioprinting of Hybrid Materials for Regenerative Medicine Implementations in Innovative SMEs Piticescu , Roxana Mioara
17:00	A9 - Implementation of Thermographic Method for DLMD Process Monitoring - Rizzo, Antonella	B9 - Seamless Flowformed Tube Made of Wire Arc Additive Manufacturing - Shirizly, Amnon	C9 - The Effects of Heat Treatments on the Physical Properties of NiTi20Hf Shape Memory Alloy - Keret Klainer, Michael	D9 - Efficient Manufacture of Titanium Aircraft Parts by Linear Friction Welding - Flipo, Bertrand	E9 - Micron-scale Additive Manufacturing Using Laser Transfer of Metals - Zvi Kotler
18:00	**Social evening event / Sight seeing (TBA)**				

May 31st 2018:

08:30	plenary Session #4 – Prof. Bret Conner YSU - Advanced manufacturing in metal industry				
09:00	Plenary Session #5 – Mr. Rob Gorham, Executive Director of America Makes - America Makes and Smart Collaboration: A Discussion on Advancements in the Additive Manufacturing Industry).				
09:30	Coffee break				
	Parallel Sessions – Industrial Innovations				
	Additive Manufacturing V: Advancements in Powder Bed Fusion	**Metals processing III -**	**Alloys and Critical Metals III**	**Applications**	**Additive manufacturing VI: AM Tooling, Surface Control,**
Chair	Pande, Sarang	Todaro, Ivan	Bartl, Andreas	Anderson, Iver	Conner, Brett
10:00	A10 – invited: Mechanical Properties of AlSi10Mg Specimens Fabricated by Additive Manufacturing Using Selective Laser Melting (AM-SLM) - Uzan, Naor	B10 – Invited: Burnishing of AISI 4140 alloy steel surface using diamond matrix composite tools - Szutkowska, Magdalena	C10 – Invited: Critical Raw Materials and their influence in the key present and future technological and industrial value chains for Europe - Cuesta-Lopez, Santiago	D10 – Invited: Advanced Intermetallic Titanium Aluminides - Development Status and Applications - Clemens, Helmut	E10 – Invited: The Internet of Things (IoT) for Casting with 3D Printed Sand Molds – MacDonald, Eric
10:30	A11 - Thermally Induced Porosity (TIP) in Additively Manufactured (AM) AlSi10Mg Alloy - Struma, Einat	B11 - Characterization of Molybdenum Processed by Equal Channel Angular Pressing - Khoptiar, Yuri	C11 - The Concern of Critical Raw Materials - Grilli, Maria Luisa	D11- Influence of Nanoparticles Amount on Erosive Wear Properties of ZA-27 Alloy-based Dual-size Composites - Vencl, Aleksandar	E11 - SLM printed steel conformal cooled insert for extrusion dies with anti-wear bearings – Todaro, Ivan
10:50	A12- Ultrasonic Characterization of Additively Manufactured	B12 - Overview of Additive Manufacturing in Metal Forming at the	C12 - Non-ferrous Alloys Modification by	D12 - Metal Fiber Brushes for Slip Ring and an	E12 - An Effect of DMLS Process Parameter on Surface Roughness and Dimensional

	AlSi10Mg Using Time of Flight and Attenuation Calculations - Sol, Tomer	IUL - Ramona Hölker-Jäger	Nanocomp ounds - Borodianski y, Konstantin	Innovative Application - Sala, Antonio-J.	Accuracy Of CL50WS Material - Hiren Gajera
11:10	A13 - Tungsten Additive Manufacturing –Technical Aspects - Chaiat, Dov	B13 - Electro Chemical Machining, an Effective Method for Processing Materials used in Extreme Working Conditions- Pandilov, Zoran	C13 - Temperatur e Effects on high strain rate behaviour of a Tungsten Alloy - Cadoni, Ezio	D13 - Light-Weighting in Metal Additive Manufacturing Using Topological Optimization - Thoma, Dan	E13 - Surface modification of AM parts using plasma electrolytic polishing - Zeidler, Henning
11:30	A14 - Methodology for Maturity Evaluation of Powder Bed Additive Manufacturing Based on MRL and NDE- Yeheskel, Ori	B14 - Analytical and Experimental Investigation of Passive Granular Medium-based Tube Press Hardening - Chen, Hui	C14 - Recent Developme nts in the Research of BCC Refractory High Entropy Alloys – Eshed, Eyal	D14 - Actual Changes of Materials and Production Processes of the Primary Structure of Large Passenger Aircrafts –Martin Peter	E14 - Laser Assisted Synthesis of High Entropy Alloy Coating on Aluminum: Tribocorrosion Behavior - Joshi, Sameehan
11:50	A15 - Residual Stress Reduction in Selective Laser Melting of Nickel Superalloys - Brif, Yevgeni	B15 - Characterizatio n of Interface Strength Obtained by Hot Rolling: A Computational Study Validated by Experiments on Al 1050 and Al 6061 - Priel, Elad	C15 - Surface Contaminat ion and Carbide Free Zone Formation during Hot Isostatic Pressing of Superalloy IN100 - Rajnovic, Dragan	D15 - Additive manufacturing innovations is Israel – Galun, Udi.	E15 - Properties of Wire and Arc Additive Manufactured Materials - Addison, Adrian
12:10	Lunch				
13:30	Plenary Session #6 – Dr. Alex King - Replacement of critical raw material				
14:00	Plenary Session #7 – Univ. Prof. Dr. Leopold WEBER: Criticality of Minerals: Myth or Truth?				

14:30	Open discussion (Panel) – critical raw materials replacement - current state and future challenges (Alex King, Leopold Weber, Peter Sachsenmeier, Maria Luisa Grilli , Andreas Bartl) Moderated by Dr. Santiago Cuesta Lopez				
15:00	Coffee break				
	Parallel Sessions – Industrial Innovations				
	Additive manufacturing VII - Electron Beam Melting	**Metals processing IV**	**Alloys and Critical Metals IV**	**Applications IV –**	**Additive Manufacturing VII - New material and process development**
Chair	Eliaz, Noam	Sachsenmeier, Peter	Cadoni, Ezio	Bamberger, Menachem	Pande, Sarang
15:30	A16 - invited: Mapping the Tray of Electron Beam Melting (EBM) Ti-6al-4v Samples - Properties and Microstructure - Tiferet, Eitan	B16 – Invited: Metal-coated Cenospheres via Magnetron Sputter Coating Route - A New Precursor for Metal Matrix Syntactic Foams - Lapkovskis, Vjaceslavs	C16 – invited: Strategies for Development of Novel Material Systems and Coatings for Extreme Environments - Piticescu, Robert	**D16 - Dr. Julie Christodoulou (Invited, TBC)**	E16 - invited: Improvement of Gas Atomization Processing Efficiency and Powder Quality to Benefit Additive Manufacturing – Anderson, Iver
16:00	A17 - Micron-scale Monte Carlo Simulations for Additive Manufacturing Process using Electron Beam - Orion, Itzhak	B17 - Spark Plasma Sintering Method for Recycling of Tungsten-Containing Composite Materials - Lapkovskis, Vjaceslavs	C17 - Mitigation of Metals Corrosion in Energy Generation Plants by Their Surface Protection with Coatings - Boycheva, Silviya	D17- Revolutionary Al-air Battery Technology – Gelman, Danny	E17 - Development of a Ni-base Superalloy for Additive Manufacturing – White, Emma
16:20	A18 - In Situ Neutron Diffraction of Additive Manufactured Ti6Al4V Under	B18 - Compression Creep of Copper under Electric Current Studied by a Spark Plasma	C18 - Annealing Effect on the Phase Composition and Structural	D18 – Al-Co-Cr-Fe-Ni high entropy alloy: novel features and understanding Meshi, Louisa	E18- Solidification during Selective Laser Melting of Co-29Cr-6Mo Alloy - Zhan Chen

	Tensile Stress - Ganon, Yaron	Sintering (SPS) Apparatus - Ratzker, Barak	Transformations of Iron-based Amorphous Alloys Depending on CRM Content - Cherkezova-Jeleva, Zara		
16:40		B19 - Innovations in twin-roll casting technologies for magnesium strips and wires – Prahl, Ulrich	C19 - The Effects of Thermomechanical Treatments on a New Fe-rich Dual-phase Complex Concentrated Alloy (CCA) - Young, Marcus	D19 - SPD processed materials for energy applications – Lapovok, Rimma	**TBC** - Corrosion modelling in Ni, Caspary Toroker, Maytal
17:05	Closing of TIME2018 and Towards TIME2020				

June 1st 2018

9:00	General assembly of COST action "CRM-EXTREME" at Technion