TUESDAY 22 OCTOBER 2019

WELCOME & REGISTRATION

14:00 – 16:00  Registration and set-up
17:00 – 18:00  Welcome cocktail cruise along the Vaal River
18:00 – 20:00  Braai on the lower lawns near the swimming pool

WEDNESDAY 23 OCTOBER 2019

DAY 1

9:45 – 10:30  PLENARY 1: Heron
Dr Francisco C. Robles Hernández, Associate Professor: University of Houston, Mechanical Engineering
Current and Future Developments on Railway Steels

10:30 – 11:00  CONFERENCE PHOTOS ON THE LAWN • MORNING REFRESHMENTS (VENUE: MINIEXP0 TENT)

DAY 1 SESSION 1

Venue: Heron
Chairperson: Dr Sagren Govender

ADVANCED MANUFACTURING

11:00 – 11:20  The Effect of Cast Structures on Texture and Mechanical Properties of AISI 433 Ferritic Stainless Steel
Mbavhalela Maumela ADM1

11:20 – 11:40  Effect of the Quench Temperature on the Mechanical Properties of A Medium C Mn High Si Steel During Q&P Heat Treatment Process
Vinod Kurup* ADM2

11:40 – 12:00  Effect of Intercritical Annealing of Normalised Nb-Ti-V Microalloyed Plate Steel on Microstructural Evolution
Patrick Kambilinya ADM4

12:00 – 12:20  Effect of Soaking and Tempering Temperatures on High Vanadium Alloys For Grinding Media
Absalom Mabebo* ADM5

12:20 – 12:40  A comparative analysis of mould strength behavior in sodium silicate and alkaline phenolic binders after thermal reclamation
Livhuwani Libunyu ADM6

12:40 – 13:00  Metal Injection Moulding of 17-4PH Stainless Steel: Effects of Porosity on the Mechanical Properties of the Sintered Products
Mandy Seerane Ni-4

LUNCHEON SERVED AROUND THE SWIMMING POOL

Compiler: Dr Jones Papo

SESSION CHAIR: Dr Jones Papo

9:00 – 9:05  Conference Opening: Dr Jones Papo – Manager, Advanced Materials Division, Mintek

9:05 – 9:15  Welcome Address: Dr Molefi Motuku – CEO and President, Mintek

9:15 – 9:30  Opening Address: Mr Imraan Patel – Deputy Director General, DSI

SESSION 1

Venue: Bishop
Chairperson: Dr Alain Mwamba

TIKTANUM

11:00 – 11:20  Fragmentation within the titanium industry
Nicole Roux* Ti-1

11:20 – 11:40  Influence of Sintering Temperature on Densification, Microstructure and Mechanical Properties of Ti-6ni Alloy Developed Via Spark Plasma Sintering
Samson Olaitan Jeje Ti-2

11:40 – 12:00  Effect of Interritical Annealing of Normalised Nb-Ti-V Microalloyed Plate Steel on Microstructural Evolution
Patrick Kambilinya ADM4

12:00 – 12:20  Nanindentation investigation on hardness and modulus of spark plasma sintered Ti-Za-Zr alloy.
Moipone Teffo Ti-3

12:20 – 12:40  A comparative analysis of mould strength behavior in sodium silicate and alkaline phenolic binders after thermal reclamation
Livhuwani Libunyu ADM6

12:40 – 13:00  Effect of Powder Bed Preheating on Distortion and Mechanical Properties In High Speed Selective Laser Melting
Londiwe Motibane Ti-6

COMPUTATIONAL MATERIALS SCIENCE

11:00 – 11:20  Density Functional Theory Study of TiPd Allowing With Os as Potential High Temperature Shape Memory Alloys
Ramogaha Diale* CMS1

11:20 – 11:40  First Principle Study of HF Molecule Adsorption on TiO2 (110) Surface
David Tshwane* CMS2

11:40 – 12:00  First-principles studies on the structural, electronic and Mechanical properties of L10 and L12 FexPt1-x alloys
Ndanduleni Lethole CMS3

12:00 – 12:20  Surface Morphology Characterisation for Parts Produced by the High Speed Selective Laser Melting
Mfanufikile Shange CMS4

12:20 – 12:40  The pursuit for mechanically stable systems of Zr-nb and Zr-nb+X (X: Sn and Co) for high temperature applications
Magoja Malebati* CMS5

12:40 – 13:00  Effect of Tantalum on Cubic B2 Ti50P50 Structure
Mphamela Baloyi* CMS6

*AMI registered student
## DAY 1 KEYNOTE SESSION 1

**14:00 – 14:30**

**SESSION CHAIR:** Mr Joseph Moema  
**KEYNOTE 1:** Heron  
Mr Kenneth Brian Perel, MultiAlloys  
Evolution of an Alloy: The “Alloy C” Family of Alloys

<table>
<thead>
<tr>
<th>TIME</th>
<th>VENUE</th>
<th>CHAIRPERSON</th>
<th>TITLE</th>
<th>SPEAKER</th>
<th>VENUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:40 – 15:00</td>
<td>Heron 1</td>
<td>Dr Thabang Ntho</td>
<td>Exploring the Potential of N-Acylated Chitosan for the Removal of Toxic Pollutants from Wastewater</td>
<td>Saloshnee Naidoo CT1</td>
<td>Bishop</td>
</tr>
<tr>
<td>15:00 – 15:20</td>
<td>Bishop</td>
<td>Prof. Lesley Chown</td>
<td>Effect of Particle Size Distribution on Green Properties and Sintering of Ti-6Al-4V Khodani Ramabulana* Ti64-2</td>
<td>Pillared Interlayered Clays as Catalyst for Wastewater Treatment: CostEffective and Sustainable Materials Jeffrey Baloyi CT2</td>
<td>Swift</td>
</tr>
<tr>
<td>15:20 – 15:40</td>
<td>Swift</td>
<td>Dr Ronald Machaka</td>
<td>The Microstructural and Mechanical Characterization of the B-Type Ti-11.1Mo-10.8Nb Alloy For Biomedical Applications</td>
<td>Solar Photocatalytic Hydrogen Production from Glycerol Reforming using Ternary Cu/THS/Graphene Tumelo Seadira CT3</td>
<td>Bio1</td>
</tr>
<tr>
<td>15:40 – 16:00</td>
<td>Heron 1</td>
<td>Hendriette van der Walt</td>
<td>Investigating the flow of Aluminium Oxide nanofluids using Particle Image Velocimetry Clayton Mubishi P-Nano1</td>
<td>Kinetic study of phenol oxidation in a trickle bed reactor over Al/Zr-pillared clay catalyst Tladi Makatsa CT4</td>
<td>Biomedical Alloys</td>
</tr>
</tbody>
</table>

## SESSION 2

**14:40 – 15:00**

**Catalysis**

1. Morphological Characterization of Recycled Powder and Microstructures of Ti-6Al-4V Components Synthesized By LENS Additive Manufacturing Percival Sibisi Ti64-2
2. Biocompatibility Study of Ti-Based Alloys Fabricated By Spark Plasma Sintering Mithavini Mahundla* Bio1

**Biomedical Alloys**

1. Development of a Biocompatible Ti-Nb Alloy for Orthopaedic Applications Lusanda Fikenzi* Bio2
2. Studying the Effect of Surface Conditioning on the Corrosion Performance of Titanium Dental Implants Nomsombuluko Masia* Bio4

## AFTERNOON REFRESHMENTS AND POSTER SESSION

**15:50**

1. Investigating the flow of Aluminium Oxide nanofluids using Particle Image Velocimetry Clayton Mubishi P-Nano1
2. Zinc oxide nanosheets functionalised by carbon nanotubes for CO gas sensors Hleko Chauke P-NC1
3. Extraction of Nickel from Nickel-Magnesium master alloy waste Daniel Sekotlong P-Ni-1
4. Chilling effects on the nucleation of carbide particles within a Chromium Iron Carbon alloy Fabrizio Canei P-PM1
5. Characterization of high entropy alloy for abrasive wear application Steven Mavhungu P-PM2
6. A molecular dynamics study of Ti32 nanocluster Tshegofatso Phaahla* P-Nano2
7. Washcoating of cordierite monolith with novel Al/Zr-pillared clay catalyst: Comparison of drying methods Jeffrey Baloyi CT1
8. Determination of lattice parameters for 50Ni-50Cr Alloy Violet Hilane* P-CT1
9. Investigation of titanium powder compacts sintered in high-vacuum and inert gas atmosphere Anthony Govender* P-Ti-2

**18:30**

**FREE EVENING BUFFET DINNER SERVED IN THE RESTAURANT**

*AMI registered student*
## THURSDAY 24 OCTOBER 2019

### DAY 2

#### PLENARY SESSION 2

**9:00 – 9:30**

*SESSION CHAIR:* Mr. Joseph Moema  
*PLENARY 2:* Heron  
**Dr Thabi Leoka, Argon Asset Management**  
*S.A.: Dawn or Dusk?

**9:30 – 10:00**

- *Presentation by Hot Platinum*
- *Musi Manzi, Chief Executive Officer at Aluminium Federation of South Africa*

#### SESSION 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker/Author</th>
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</thead>
<tbody>
<tr>
<td>10:10 – 10:30</td>
<td>Development of a Mathematical Equation Describing the Strain Hardening Behaviour of Metastable AISI 301 Austenitic Stainless Steel</td>
<td>Tulani Mukarati*</td>
</tr>
<tr>
<td>10:30 – 10:50</td>
<td>EBSD Characterisation of the B2 Orientation In γ-TiAl Based Alloy</td>
<td>Maria Mathabathe*</td>
</tr>
<tr>
<td>10:50 – 11:10</td>
<td>Microstructure Characterisation and Microhardness of P92 Steel Heat Treated at the Transformation Temperatures</td>
<td>Japheth Obiko</td>
</tr>
</tbody>
</table>

#### ADVANCED ALLOYS

**10:10 – 10:30**

*Influence of Stress Relieving Thermal Cycles on AISI10Mg Specimens Produced by Selective Laser Melting*

**10:30 – 10:50**

*Prospects of Graphite - Polypropylene/ Epoxy Blend Composite for High Performance Bipolar Plate In Polymer Electrolyte Membrane Fuel Cell*

**10:50 – 11:10**

*Development and Characterisation of Porous Ti-Sn-SiC Composites Intended For Biomedical Application*

#### POWDER METALLURGY

**10:10 – 10:30**

*Fretting Biocorrosion Behaviour of Titanium-Zirconia Composites In Foetal Bovine Serum*

**10:30 – 10:50**

*Preparation and Characterization of the 60Al-40V Master alloy*

**10:50 – 11:10**

*Influence of Impeller Diameter on the Performance of Centrifugal Pumps*

#### COMPOSITES

**10:10 – 10:30**

*Development of a Mathematical Equation Describing the Strain Hardening Behaviour of Metastable AISI 301 Austenitic Stainless Steel*

**10:30 – 10:50**

*Prospects of Graphite - Polypropylene/ Epoxy Blend Composite for High Performance Bipolar Plate In Polymer Electrolyte Membrane Fuel Cell*

**10:50 – 11:10**

*Development and Characterisation of Porous Ti-Sn-SiC Composites Intended For Biomedical Application*

### KEYNOTE SESSION 2

**11:30 – 12:00**

*SESSION CHAIR:* Dr. Robert Tshikhudo  
*KEYNOTE 2:* Heron  
**Dr Prof. Francesca Lessing, University of the Witwatersrand**  
*Future Prospects for the South African PGM Industry*

### DAY 2

#### ADDITIVE MANUFACTURING

**12:00 – 12:20**

*Effects of Mo Content on the Microstructural and Mechanical Properties of As-Cast Ti-Mo Alloys*

**12:20 – 12:40**

*Influence of Heat Treatment on Microstructure and Mechanical Properties of Ni-Fe-Co Ternary Alloy Prepared Via Spark Plasma Sintering*

**12:40 – 13:00**

*Effect of Nickel Powder Particle Size on the Microstructure and Thermophysical Properties of Spark Plasma Sintered NiCrCoAlTiW-Ta Superalloy*

#### MATERIALS FOR EXTREME ENVIRONMENT

**12:00 – 12:20**

*Preparation and Characterization of Glass Ceramic Composites From South African Coal Fly Ash*

**12:20 – 12:40**

*Development of MgAl2O4 Grain Refiner In Al In-Situ Composite Through H3BO3 Addition*

**12:40 – 13:00**

*Development of Lining Materials for Reactor Vessel Used in the CSIR Titanium Process*

### KEYNOTE SESSION 3

**14:00 – 14:30**

*SESSION CHAIR:* Dr. Jeff Baloyi  
*KEYNOTE 3:* Heron  
**Mr Colin Hautz, Chief Marketing Officer at ArcelorMittal South Africa**  
*Steel in the 21st Century*
THURSDAY 24 OCTOBER 2019

**SESSION 3**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Venue</th>
<th>Chairperson</th>
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</thead>
<tbody>
<tr>
<td>14:30 – 14:50</td>
<td>Influence of Spark Plasma Sintering Temperature on the Densification and Micro-Hardness Behaviour of Ni-Cr-Al Alloy</td>
<td>Heron</td>
<td>Dr Brendon Shongwe</td>
</tr>
<tr>
<td>14:50 – 15:10</td>
<td>SiC and Al Surface Cladding of Ti-6Al-4V for Improved Wear Properties – The Binary Advantage</td>
<td>Bishop</td>
<td>Prof. Hasani Chauke</td>
</tr>
<tr>
<td>15:10 – 15:30</td>
<td>Major Determinant of Service Life In Magnesia-Graphite Slagline Refractory Lining In Secondary Steelmaking Ladle Furnace</td>
<td>Bishop</td>
<td>Prof. Hasani Chauke</td>
</tr>
<tr>
<td>15:30 – 15:50</td>
<td>Can topology optimisation be used in design for manufacturing?</td>
<td>Bishop</td>
<td>Prof. Hasani Chauke</td>
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**ADVANCED MANUFACTURING**

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<td>SiC and Al Surface Cladding of Ti-6Al-4V for Improved Wear Properties – The Binary Advantage</td>
<td>Ugachukwu Okoli</td>
<td>Ti64-I</td>
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<tr>
<td>Major Determinant of Service Life In Magnesia-Graphite Slagline Refractory Lining In Secondary Steelmaking Ladle Furnace</td>
<td>Iyiola Otunniyi</td>
<td>ADM3</td>
</tr>
<tr>
<td>Can topology optimisation be used in design for manufacturing?</td>
<td>Sam Ndumo</td>
<td>PD4</td>
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**ADVANCED ALLOYS**

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<tr>
<td>New possibilities for osmium: A review</td>
<td>Duduzile Nkomo</td>
<td>OS1</td>
</tr>
<tr>
<td>The Effects of Ru, Cu, Zr and Hf on Mechanical Properties In Ti-Pt High Temperature Shape Memory Alloys</td>
<td>Mordecai Mashamaite</td>
<td>AA1</td>
</tr>
<tr>
<td>Investigation of Graphene-Based Nanocomposite For Hydrogen Storage</td>
<td>Jeffrey Baloyi</td>
<td>CT5</td>
</tr>
<tr>
<td>A review of plasma spraying technology and applications in South Africa</td>
<td>Jaco van der Walt</td>
<td>ADM7</td>
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**AFTERNOON REFRESHMENTS AND POSTER SESSION**

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<tbody>
<tr>
<td>16:00 – 17:30</td>
<td>The effect of Fe50-xMxAl50 doping at high temperature: A supercell approach</td>
<td>miniExpo Tent</td>
<td>Melanie Smit</td>
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<td>Effect of reinforcement and manufacturing method on mechanical properties of glass and basalt epoxy composites</td>
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<td>Purifying crude titanium powder produced by metallothermic reduction utilizing the hydrometallurgical route of acid leaching</td>
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<td>Development of dental biomaterial by spark plasma sintering</td>
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<td>Separation of Zirconium and Hafnium from a Zr(HF)Cl4 and Zr(HF)(SO4)2 acidic feed solution using organophosphorus extractants</td>
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<td>First-principle study of the structural, elastic and electronic properties of Ir-TM (TM=Cu, Pt, Fe and Ni) compounds with improved room temperature ductility</td>
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<td>Characterisation of Fe-Mo powders spheroidised at different plasma powers</td>
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<td>Powder development for metal additive manufacturing</td>
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<td>The influence of vanadium and niobium addition on the mechanical properties of 25wt% white cast iron</td>
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19:00 – AWARDS DINNER: THE ISLAND, THEME 007, STRICTLY FORMAL

*AMI registered student

FRIDAY 25 OCTOBER 2019

**AMI FORUM**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Venue</th>
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<tbody>
<tr>
<td>9:00 – 12:30</td>
<td></td>
<td>BISHOP</td>
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