World Congress on Micro and Nano Manufacturing – WCMNM 2022

Congress Chair

Sylvie Castagne, *KU Leuven, Belgium*

Congress Co-Chairs

Stefan Dimov, *University of Birmingham, UK*

Lawrence Kulinsky, *University of California, Irvine, USA*

Kuniaki Dohda, *Northwestern University, USA*

Dominiek Reynaerts, *KU Leuven, Belgium*

Congress Programme

Campus Gasthuisberg, KU Leuven

19th – 22nd September 2022

Version 1.0 (10/09/2022)

Monday 19th September 2022

Time 18:45	
Registration	**(Town Hall / Grote Markt)**
Time 19:00-20:00	
Welcome Drink	**(Town Hall / Grote Markt)**

Tuesday 20th September 2022

Time 8:00-9:00
Registration — **Campus Gasthuisberg Onderwijs en Navorsing (O&N2)**
Time 9:00-9:30
Opening & Welcome Speeches **Chair:** Sylvie Castagne **Room:** BMW6 **Welcome address**: Dominiek Reynaerts
Time 9:30-10:30
Keynote Speech I **Chair:** Stefan Dimov **Room:** BMW6 **Invited talk:** "Don't Forget Reliability during MEMS Development" Prof. Ingrid De Wolf, Imec and Dept. Materials Engineering, KU Leuven (Belgium)
Time 10:30-10:50
Coffee Break

Time 10:50-12:30		
Session 1a: Mechanical Micromachining I **Chairs:** Wayne Hung, Rinku Mittal **Room:** BMW6	**Session 1b:** Laser Processing **Chairs:** Pavel Penchev, Krishna Kumar Saxena **Room:** HP3	**Session 1c:** Injection Moulding **Chairs:** Irene Fassi, Fu-Chuan Hsu **Room:** HP8
10:50-11:10 57. **Micromilling H13 Tool Steel and Tool Life Criteria for Coated Microtools** *Russell A., Suri S.B., Ribeiro K.S.B., Coelho R.T., De Freitas S.A., Gomes M.C., Da Silva M.B., De Oliveira D., Hung N.P.W*	10:50-11:10 6. **Method for Assessing the Performance of Multi-Axis Laser Processing Strategies** *Themistoklis Karkantonis, Pavel Penchev, Tian Long See, Stefan Dimov*	10:50-11:10 27. **Effects of Surface Roughness on the Properties of Glass Fibre Filled Micro Injection Moulded Plastic Parts** *Erindi N., Vella P., Rochman A.*
11:10-11:30 37. **Tribological Performance Analysis of Textured Cutting Insert Created Via High Speed Micromilling Process** *Akash Chadaram, Gururaja S, Rinku Mittal, Kundan K. Singh*	11:10-11:30 15. **Removal Rates Scalability with MHz Burst Mode Ultrashort Laser Processing** *Hoang Le, Themistoklis Karkantonis, Vahid Nasrollahi, Pavel Penchev, Stefan Dimov*	11:10-11:30 61. **Replication Study of Molded Micro-Textured Samples Made of Ultra-High Molecular Weight Polyethylene for Medical Application** *Francesco Modica, Vito Basile, Rossella Surace, Irene Fassi*
11:30-11:50 55. **A Study of Bulk Metallic Glass Drilling Process Near Plowing-dominated Region** *Nattasit Dancholvichit, Chi-Ting Lee, Shiv Kapoor*	11:30-11:50 28. **Effect of Femtosecond Laser Textured Copper Surfaces on Wettability and Boiling Heat Transfer Enhancement** *Balasubramanian Nagarajan, Larina Majidova, Louis Jamaer, Maria Rosaria Vetrano, Sylvie Castagne*	11:30-11:50 67. **Injection Compression Molding of Nanostructures from Direct Structured PVD Hard Coatings** *H. Ruehl, T. Guenther, A. Zimmermann*

11:50-12:10 36. **Influence of Hydrogen-Free DLC Coated Micro Ball Endmills on Machining Response and Tool Wear in High Speed Micromilling of Ti6Al4V** *Priyabrata Sahoo, Suraj Kumar, Rinku K. Mittal Ramesh K. Singh, H. C. Barshilia*	11:50-12:10 32. **Investigation of Oxide Layer Removal of Low Carbon Steel using Nanosecond Pulsed Laser via Response Surface Methodology** *Almigdad W. G. Ali, Vishnu Narayanan, Ramesh Singh, Deepak Marla* 12:10-12:30 51. **A Study on Laser Melting of EBM Ti6Al4V Surfaces in Different Environments** *Rohit Gupta, Rajat Mishra, Subhrajit Chand, Madhu Vadali*	11:50-12:10 72 **Investigating the Deviations between Micro-Injection Molding Experiments and Simulations of MicroStructured Micro-Optical Components** *Komeil Saeedabadi, Alberto Santi, Matteo Calaon, Marcos Sampaio, Guido Tosello* 12:10-12:30 49 **Study on the Influence of Ventilation Position and Cutting Conditions on Breathable Molds** *Kazuyoshi Oota, Kyohei Nakamura, Koharu Horikawa, Wataru Natsu*
Time 12:30-13:30		
Lunch		
Time 13:30-14:50		
Session 2a: Mechanical Micromachining II: **Chairs:** Massimiliano Annoni, Shih-Ming Wang **Room:** BMW6 13:30-13:50 **30. Experimental Investigation of Different Tool Geometries when Micromilling H13 Tool Steel** Lucas Barbosa Queiroz, Samuel Alvesde Freitas, Tamires Isabela Mesquita Botelho, Arthur Vieira de Souza, Marcio Bacci da Silva, Wayne Nguyen P Hung	**Session 2b:** Electrical Discharge Machining I: **Chairs:** Giancarlo Maccarini, Mariangela Quarto **Room:** HP3 13:30-13:50 44. **Micro-EDM Milling of Free Form Surfaces Exploiting a 2 DOF High-Precision Rotary Table: Preliminary Tests** *Francesco Modica, Vito Basile, Irene Fassi*	

13:50-14:10 45. **An Experimental Investigation of Deep-Hole Micro-Drilling of Pure Mg for Biomedical Applications** *Margherita Pizzi, Francesco De Gaetano, Marco Ferroni, Federica Boschetti, Massimiliano Annoni*	13:50-14:10 9. **Influence of Different Electrode Materials During Micro Hole Fabrication in Titanium Grade 5** *K P Maity, H. Mishra*	
14:10-14:30 22. **The Automatic Tool Wear Monitoring System for Micro-Milling Application with Image-Based Wear Detection** *Muhammad Naufal Pratama, Christiand, Gandjar Kiswanto, Adinda Rahmah Shalihah*	14:10-14:30 12. **Preliminary Study for Surface Quality Implementation of SLM Samples via Micro-EDM** *Mariangela Quarto, Paola Serena Ginestra, Andrea Abeni*	
14:30-14:50 43. **Assessment of Drilling Performance with Micro/Nanobubble-mixed Cutting Fluid Delivery** *Prabhat Ranjan, Soham Mujumdar**	14:30-14:50 71. **Micro-Electrical Discharge Machining—EDM Effect of the Electrical Parameters on the Geometrical Performance of the Machining** *Asmae Tafraouti*, Pascal Kleimann, Yasmina Layouni*	
Time 14:50-15:10		
Coffee Break		

Time 15:10-16:30		
Session 3a: Additive Manufacturing: **Chairs:** Burak Ozdoganlar, Madhu Vadali **Room:** BMW6	**Session 3b:** Electrical Discharge Machining II: **Chairs:** Albert Wen-Jeng Hsue, Yao-Yang Tsai **Room:** HP3	
15:10-15:30 29. **Design of a Low Cost Micro-Electrochemical Additive Manufacturing Setup** *Muhammad Hazak Arshad, Krishna Kumar Saxena, Rex Smith, Jun Qian, Dominiek Reynaerts*	15:10-15:30 21. **Comparison of EDM Trimming with Ultrasonic Assisted Milling (UAM)for the Permeability Mold Steel Fabricated by SLM-AM Technology** *Albert Wen-Jeng Hsue, Li-Wei Lu,Chien-Lun Li*	
15:30-15:50 65. **Microscale 3D Printing of Water Ice (3D-ICE)** *Akash Garg, Philip R. Le Duc, Burak Ozdoganlar*	15:30-15:50 34. **Automatic Recognition of Machinable Regions for Micro-EDM** *Jun-Wei Lu, Yao-Yang Tsai, Shih-Ming Wang*	
15:50-16:10 69. **On the Assessment of the Effect of Multiple Process Parameters on the Precision of 3D Inkjet Printing** *Ahmed Elkaseer*, Matthias Kuchta, Steffen* Scholz	15:50-16:10 20. **Experimental Analysis of Powder Mixed EDM of Hastelloy C-276** *Apurva Kulkarni, Ganesh Dongre, Ravi Raut*	
Time 16:15-17:00		
4m Association committee meeting Room: BMW6	I2M2 committee meeting Room: HP3	IFMM committee meeting Room: HP8
Time 17:00-17:30		
4M, I2M2 and IFMM joint committee meeting Room: BMW6		
End of Day II		

Wednesday 21st September 2022

Time 08:30-09:00		
Registration		**Campus Gasthuisberg Onderwijs en Navorsing (O&N2)**
Time 9:00-10:00		
Keynote Speech II **Chair:** Kuniaki Dohda **Room:** BMW6 **Invited talk:** "Micro Machining of Brittle Materials" Prof. Takashi Matsumura, Tokyo Denki University (Japan)		
Time 10:00-10:20		
Coffee Break		
Time 10:20-12:00		
Session 4a: Surface Engineering I: **Chairs:** Balasubramanian Nagarajan, Gianluca D'Urso **Room:** BMW6	**Session 4b:** Process Control and Inspection Systems **Chairs:** Kornel Ehmann, Shih-Ming Wang **Room:** HP3	**Session 4c:** Applications of Micro Fabrication Processes **Chairs:** Tatsuhiko Aizawa, Izidor Sabotin **Room:** HP8
10:20-10:40 59 **Laser Removal of SiN x Nanofilm on Si Substrate via Film Breakage Due to Thermal Expansion** *Pinal Rana, Anil Kottantharayil, Deepak Marla*	10:20-10:40 25. **Optical Dimensional Metrology for Quality Inspection of the Functional Surface of Punching Tools** *Kerstin Zangl, Reinhard Danzl, Urban Muraus, Franz Hemli*	10:20-10:40 47. **Punch-Edge Sharpening Effect on Process Affected Zone and Punch Wear in Punching Non-Oriented Electrical Steel Sheets** *Tomomi Shiratori, Youhei Suzuki,Tatsuhiko Aizawa*

10:40-11:00 48. **The Effect of Substrate Temperature on Autonomously Generating Micro-Textured Surfaces with Regular Alignment Shapes by Applying Molecular Beam Epitaxy with Helicon Sputtering Molecular Beam Source for Nanoimprint Die** *Akira Kakuta, Yasuyuki Shigeta*	10:40-11:00 46. **Control of the Plasma-Workpiece Distance Using a Convolution Neural Network in Laser-Induced Plasma Micromachining** *Suman Bhandari, Dominik Kozjek, Jian Cao, Kornel Ehmann*	10:40-11:00 60. **Two Step Process Chain for Micromixer Tool Insert Production** *Izidor Sabotin, Joško Valentinčič*
11:00-11:20 35. **Strengthening of Tungsten Carbide Ceramicsby Ultrashort Pulse Laser Shock Peening** *Arun Prasanth Nagalingam, ArunIngersol Nithin Kumar Gupta Dachepally, Swee Hock Yeo*	11:00-11:20 73. **Edge Radius Impact on The Tool Geometry Estimation Process: Application in Tool Pre-Setting Systems** *Amrozia Shaheen, Klaus Liltorp, Nicolaj Elias Nielsen Christian Wissing Kruse, Giuliano Bissacco*	11:00-11:20 64. **Freeze Casting of Silica with Controllable Microporosity** *Mert Arslanoglu , Burak Ozdoganlar, Rahul Panat*
11:20-11:40 26. **Influence of Initial Roughness on Laser Ablation of AA7075 Alloy and its Wettability Transition** *Nishkarsh Srivastava, Biki Kumar Sah Kalwar, Madhu Vadali*	11:20-11:40 41. **Study of AE and Sound Signals in Micro Laser Welding** *Nai-Chia Chi, Ming-Chyuan Lu*	11:20-11:40 40. **Adhesion Improvement of the Electroless Film Deposited on Glass by the Ultrasonic Micromachining Process** *Harsh Pandey, Karan Pawar, Pradeep Dixit*
11:40-12:00 33. **The Effects of Multiple Scans on Heat Penetration and Surface Roughness During Laser Surface Melting** *Justin Hijam, Sunilkumar Turpati, Madhu Vadali*		11:40-12:00 5. **Influences of Fit Clearance on Extrusion Force of Titanium Alloy Micro-Gears** *Xiangzhong Yan*, Yi Yang, Kunlan Huang, Mingxia Wu*

Time 12:00-13:00		
Lunch		
Time 13:00-14:20		
Session 5a: Surface Engineering II **Chairs:** Madhu Vadali, Tatsuya Funazuka **Room:** BMW6	**Session 5b:** Biomanufacturing and biomedical devices **Chairs:** Lawrence Kulinsky, Josko Valentincic **Room:** HP3	**Session 5c:** Process Modelling and Simulation I: **Chairs:** Shiv Kapoor, Samuel Bigot **Room:** HP8
13:00-13:20 *52.* **The Process Parameters of Micro Particle Bombarding (MPB) for Surface Integrity Enhancement of Cermet Material** *Fu-Chuan Hsu, Li-Jie Chen, Zong-Rong Liu, Hsiu-An Tsai, Chin-Hao Lin, Chia-Hung Huang, Tsung-Jen Cheng, Hwa-Teng Lee, Chiu-Feng Lin*	13:00-13:20 *7.* **Development of Micro Device Sensing for Surgical Robot – Investigation of Atherosclerosis Models** *Akane Muranaka, Atsushi Murakami, Tohru Sasaki, Shinichiro Sugawara, Keigo Sakakibara, Atsushi Shibata, Kenji Terabayashi, Akihiro Kiri, Kuniaki Dohda*	13:00-13:20 56. **Simulation of Crater Formation During the Micro EDM Process Using the ALE Method** *Sohaib Raza, Sujit Kadam, Hreetabh Kishore, Chandrakant Kumar Nirala*
13:20-13:40 *2.* **Effect of Punch Surface Texture on Micro-Extrudability of AA6063 Micro Backward Extrusion** *T. Funazuka, K. Dohda, T. Shiratori, S. Horiuchi, I. Watanabe*	13:20-13:40 *50.* **Immersed Microfluidic Spinning of Calcium Alginate Microfibers Towards Tissue Engineering Applications** *Tuo Zhou, Sahar Najafikhoshnoo, Rahim Esfandyarpour, Lawrence Kulinsky*	13:20-13:40 53. **Prediction of Milling—EDM Tool Wear: The Benefit of Process Monitoring and Machine Learning Model** *Long Ye, Ming Wu, Krishna Kumar Saxena, Jun Qian, Dominiek Reynaerts*
13:40-14:00 *58.* **Laser Color Marking of Stainless Steel: An Experimental Study on the Effect of Process Parameters** *Ankit Awasthi, Makarand S Kulkarni, Deepak Marla*	13:40-14:00 *63.* **Fabrication of Titanium Microneedle Probes using Micromachining** *Toygun Cetinkaya, Burak Ozsoy,Yusuf Ozgur Cakmak, Burak Ozdoganlar*	13:40-14:00 70. **On the Performance Evaluation of Microtextured Surfaces using Computational Fluid Dynamics: A Comparative Study** *A.Y. Escudero-Ornelas, D. Bhaduri, H. Martinez-Zavala, A.Valera-Medina, S. Bigot*

14:00-14:20 *54*. **Effects of Laser Polishing on Corrosion Resistance of Additive Manufactured Inconel 718 Alloy** *Rama Balhara, Kshitija Anam, Madhu Vadali*	*14:00-14:20* *23.* **Mechanism of Bacterial Interaction on Nanopillars using Finite Element Simulation** *Reshma Y. Siddiquie, Amit. Agrawal, Suhas S. Joshi*	14:00-14:20 38. **1D Model of Dry Electrical Discharge Machining (EDM) Plasma** *Shayan Bayki, Soham Mujumdar, Asif Tanveer*
Time 14:20-15:10		
Industry Talks **Chair: Sylvie Castagne** **Room:** BMW6 "How we design your micro machining tool", Wim Van de Vijver (LAB Motion Systems) "Micromachining of different materials using bursts of femtosecond laser pulses and industrial applications", Jean-François Poisson (Light Conversion) "Metrology aspects on micro and nanofabricated structures by surface profilometry", Sergey Lemeshko (Bruker)		
Time 15:10-15:30		
Coffee Break		
Time 15:30-16:50		
Round table I: "The Evolution of Micromanufacturing: Yesterday, Today, Tomorrow" **Chair:** Lawrence Kulinsky **Room:** BMW6 **Panellists**: Kornel Ehmann, Shiv Kapoor, Takashi Matsumura and Stefan Dimov		
Time 17:00-17:30		
Bus to City Centre (Oude Markt)		
Time 17:30-19:00		
Social event: City Walk		
Time 19:00-22:00		
Congress dinner (Faculty Club)		
End of Day III		

Thursday 22nd September 2022

Time 8:30-9:00		
Registration		**Campus Gasthuisberg Onderwijs en Navorsing (O&N2)**
Time 9:00-10:00		
Keynote Speech III **Chair:** Lawrence Kulinsky **Room:** BMW6 **Invited talk:** "Surface Engineering for Functionality- From Micro to Macro" Prof. Jian Cao, Northwestern University (USA)		
Time 10:00-10:20		
Coffee Break		
Time 10:20-11:40		
Session 6a: Novel Product Designs **Chairs:** Tomomi Shiratori, Krishna Kumar Saxena **Room:** BMW6	**Session 6b:** Emerging Micromanufacturing Methods and Smart Materials **Chairs:** Gracious Ngaile, Gandjar Kiswanto **Room:** HP3	**Session 6c:** Process Modelling and Simulation II **Chairs:** Samuel Bigot, Balasubramanian Nagarajan **Room:** HP8
10:20-10:40 3. **Manufacturing and Characterization of Acicular Fe-Ni Micro-Textured Heat-Transferring Sheets** *Tatsuhiko Aizawa, Hiroki Nakata ,Takeshi Nasu*	10:20-10:40 62. **Vortex Fluid Flow for Generation of Hydrodynamic Cavitation Aimed at Enhancing Manufacturing Processes** *Hao Pang, Swadheen Thakar, Gracious Ngaile*	10:20-10:40 39. **Ultrafast Laser Ablation of Grooves in Metals: Experimental Study and Comparison with Simulations** *Pol Vanwersch, Albert Van Bael, Sylvie Castagne*
10:40-11:00 16. **Punch-Edge SharpeningEffect on Work H ardeningand Iron Losses in Shearing Non-Oriented Electrical Steel Sheets** *Yu Okai, Youhei Suzuki, Tatsuhiko Aizawa, Masahito Katoh, Tomomi Shiratori*	10:40-11:00 13. **Enhancing Electrical Conductivity of Flexible PEDOT:PSS Film by Intense Pulsed Light Irradiation** *Sina Rezvani, Hongseok Jo, Simon S. Park*	10:40-11:00 24. **Effect of Textured Substrate on High-Speed Impact-Induced Graphene Exfoliation: A Molecular Dynamics Simulation Study** *Milukuri Srivashista, Wazeem Nishad, Sathyan Subbiah*

11:00-11:20 31. **The Design and Control Scheme of Miniature Serpentine Robot for In-Body Visual Servo Applications** *Hao-Yan Wu, Shu Huang, Chien-Yu Wu, Cheng-Peng Kuan, An-Peng Wang* *Ying-Wei Lin*	11:00-11:20 68. **Development of Dual Transverse Ultrasonic Vibration System for Micro-Forming Application** *Gandjar Kiswanto, Wildan Zulfa Abdurrohman, Siska Titik Dwiyati, Sugeng Supriadi, Hans Thiery Tjong, Edward Joshua Patrianus Mendrofa, Raditya Aryaputra Adityawarman*	11:00-11:20 42. **Numerical Study of Grain Size Affected Deformation Behavior in Two-Stage Micro Deep Drawing using CPFEM** *Xu Tong*, Ming Wang Fu*
11:20-11:40 1. **Micro-Textured Graphitic Substrate– Copper Packaging for Robustness** *Tatsuhiko Aizawa, Hiroshi Nakata, Takashi Nasu and Yoshiro Nogami*		11:20-11:40 74. **Finite Element Simulation of Micro-Drilling of A Ni-based Superalloy** *Sabana Azim, Soumya Gangopadhyay*, Siba Sankar Mahapatra*
Time 11:40-12:30		
Lunch		
Time 12:30-13:50		
Round table II: "Cutting-edge Micro- and Nano- Manufacturing Technologies and Applications: Emerging Trends, Challenges and Opportunities" **Chair:** Irene Fassi **Room:** BMW6 **Panelists:** Jian Cao, Burak Ozdoganlar, Akira Kakuta, Francesco Dal Dosso **followed by awards ceremony**		
Time 14:00-14:30		
Travel to M-Museum or Stella Artois Brewery		
Time 14:30-17:00 Social Programme		
14:30 – 16:00 **Guided Tour M-Museum**		**15:00 – 17:00** **Guided Tour Stella Artois Brewery**
End of Conference		

Practical details regarding the technical presentations

- Each individual presentation has been given a 20-minute slot in the programme (15 minutes presentation + 5 minutes discussion).
- There are maximum three parallel sessions (rooms: BWM6, HP3 and HP8). A beamer, laptop and laser pointer will be available in each room.
- Please upload and test your presentation on the laptop provided before the start of your session. One of the volunteers (KU Leuven staff member) will be present in each room to ensure a smooth transition between the speakers.
- Wi-fi is available at the venue. An individual access code is printed at the back of your conference badge.

Getting to the venue (Map)

From Brussels Airport to Leuven train station

- By train: there is a direct train between Brussels Airport and Leuven train station - duration: 15 minutes - cost: €9.50.
  Real-time online train schedules | SNCB (belgiantrain.be)
- By taxi: duration: about 25 minutes - cost: €35 to €45.

From Leuven train station to the congress venue (Gasthuisberg - O&E2, Herestraat 49 , 3000 Leuven)

- By bus: many bus lines stop at Gasthuisberg hospital - recommended: line 3 and line 600 - duration: 15 to 20 minutes - cost[1]: €1 to €3.
  View in Google Maps
- By taxi - duration: about 7 minutes - cost: €9 to €15.
- By car - be aware that at the venue we can only provide you the public parking of the hospital site.

Please note that WCMNM is co-located with the MNE-ES 2022 conference; MNE-ES signage will therefore be guiding you to the congress location from the bus stop or hospital carpark.

[1] a 5-day ticket for the local bus company De Lijn is included in your conference package – please collect it during registration.