

4M/IWMF2016

Conference Programme



4M / IWMF
2016
DENMARK

13th-15th September 2016

Chair

Guido Tosello, DTU, Denmark

Co-Chairs

Hans Nørgaard Hansen, DTU, Denmark

Kornel Ehmann, Northwestern University, USA

Stefan Dimov, University of Birmingham, UK

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Advanced Manufacturing of Multi-
Material Multi-Functional Products
Towards 2020 and Beyond



NB. Sessions in the left column are in room M1 on the 1st floor.

Sessions in the right column are in room S09 on the ground floor.

Tuesday 13th September 2016

Time 8:00-9:00 • Room M1	
Registration , Technical University of Denmark, Kongens Lyngby	
Time 9:00-9:30 • Room M1	
Opening & Welcome Speeches	
<ul style="list-style-type: none"> • 4M/IWMF2016 Chair, Dr. Guido Tosello, Technical University of Denmark, Denmark • DTU Executive Vice President and Provost, Prof. Henrik Wegener, Denmark • DTU Mechanical Engineering, Prof. Hans Hansen, Technical University of Denmark, Denmark • 4M/IWMF2016 Co-Chair, Prof. Stefan Dimov, University of Birmingham, UK 	
Time 9:30-10:15 • Room M1	
Plenary Session I	
Chair: Guido Tosello	
Invited Talk: "Topology optimization for micro- and nano-systems design", Prof. Ole Sigmund, Technical University of Denmark, Denmark	
Time 10:30-11:30	
Session 1: HINMICO Chair: Sabino Azcarate 688. Injection moulding and selective metallisation technologies for polymer Microsystems S. Dessors, L. Tenchine, S. Gout, IPC S. Azcarate, Tekniker G. Tosello, M. Calaon, Technical University of Denmark N. Miller, B. Brown, Flann Microwave Ltd C. Edouard, Flowdit T. Müller, KIT W. Wittner, Ernst Wittner GmbH M. Prantl, Alicona Imaging GmbH X. Shang, A. Batal, University of Birmingham 730. High accuracy and precision micro injection moulding of thermoplastic elastomers micro ring production M. Calaon, G. Tosello, H.N. Hansen, Technical University of Denmark R. Elsborg, Ortofon 742. Combining Metal Injection Moulding and Polymer Over Moulding for the Production of Orthopaedic Implants T. Müller, L.S. Machado, S. Scholz, KIT M. Philipp-Pichler, RHP Technology GmbH T. Wilfinger, Wittmann Battenfeld GmbH W. Wittner, Ernst Wittner GmbH M. Prantl, Alicona Imaging GmbH	Session 2: Micro Manufacturing I Chair: Morten Hannibal Madsen 676. High-resolution gravure printing of graphene biosensors T. Knoll, A. Brenner, E. Gorjup, A.Schultz, T. Velten, Fraunhofer-Institut für Biomedizinische Technik R. Warmers, G. Jenke, Saueressig GmbH C. Spacie, Haydale Ltd 679. Fabrication of functional plastic parts using nanostructured stainless steel mould inserts N. Blondiaux, R. Pugin, G. Andreatta, CSEM L. Tenchine, S. Dessors, IPC P.F. Chauvy, M. Diserens, Micropat SA P. Vuillermoz, Vuillermoz SAS 694. Ejection force analysis of sintered aluminium micro gears using a shrink-fit die principle E. Cannella, University of Padova E.K. Nielsen, M. Arentoft, IPU
Time 11:30-12:00 • M1 Foyer	
Coffee Break	
Time 12:00-13:00	
Session 3: Micro Injection Moulding I Chair: Per Magnus Kristiansen 680. Injection moulding of microstructured 3D plastic parts using standard stainless steel inserts L. Tenchine, S. Dessors, IPC N. Blondiaux, R. Pugin, G. Andreatta, CSEM P.F. Chauvy, M. Diserens, Micropat SA P. Vuillermoz, Vuillermoz SAS 715. Influence of Process Temperatures on Blister Creation	Session 4: Manufacture of Microwave Devices Chair: Juan José Vegas Olmos 701. Additive manufacturing of Ka-band antennas for wireless communications U. Armendariz, S. Rommel, S. Rodriguez, I.T. Monroy, J.J Vegas Olmos, C.B. Olsen, Technical University of Denmark 735. Rapid Prototyping by 3D Printing for Advanced Radio Communications at 80GHz and Above A. Salazar, S. Rommel, E. Anufriyev, I.T. Monroy, J.J Vegas

<p>in Micro Film Insert Moulding of a Dual Layer Membrane T. Wöhner, G. Tosello, H.N. Hansen, A. Islam, Technical University of Denmark B.R. Whiteside, University of Bradford</p> <p>728. Effects of Different Mould Coatings on Polymer Filling Flow in Thin-Wall Injection Moulding M. Sorgato, D. Masato, G. Lucchetta, University of Padova</p>	<p>Olmos, Technical University of Denmark</p> <p>743. Process Optimization for Injection Moulding of Passive Microwave Components S. Scholz, T. Müller, L.S. Machado, KIT M. Calaon, G. Tosello, Technical University of Denmark S. Dessors, IPC M. Prantl, Alicona Imaging GmbH N. Miller, Flann Microwave Ltd</p>
<p>Time 13:00-14:00 • Glass Salen ground floor</p>	
<p style="text-align: center;">Lunch</p>	
<p>Time 14:00-15:00</p>	
<p>Session 5: Hearing Aid Chair: Aminul Islam</p> <p>672. A conceptual framework for designing micro electrical connectors for hearing aid instruments S. Doagou-Rad, A. Islam, Technical University of Denmark M. Fuglsang-Philip, Oticon</p> <p>677. Feasibility study of injection mouldable conductive plastic for the hearing aid applications T.D. Merca, A. Islam, Technical University of Denmark T. Lindberg, GN Store Nord Lautrupbjerg 7</p> <p>732. Investigation of Bandgap Microstructure for Miniaturized Acoustic-Mechanical Devices: Application to BTE Hearing Aid Design J. Kook, J.S. Jensen, Technical University of Denmark</p>	<p>Session 6: Machining I Chair: Jun Qian</p> <p>693. Efficiency and quality of cutting polymer materials with cooled water jet M. Jerman, A. Lebar, P. Drešar, I. Sabotin, J. Valentinčič, University of Ljubljana</p> <p>712. Analysis of the reproducibility of Jet-ECM point removals on defined shape deviations A. Martin, H. Zeidler, M. Hackert-Oschätzchen, A. Schubert, Technische Universität Chemnitz</p> <p>725. Advantages of using a non-rigid cutting mechanism for the machining of glass G. Herrera-Granados, N. Morita, H. Hidai, S. Matsusaka, A. Chiba, Chiba University K. Ashida, I. Ogura, AIST</p>
<p>Time 15:00-15:30 • M1 Foyer</p>	
<p style="text-align: center;">Coffee Break</p>	
<p>Time 15:30-17:00</p>	
<p>Session 7: Laser Processing I Chair: José Luis Ocaña</p> <p>668. Micro-Dimple Texturing for Semi-Dry Stamping Dies T. Aizawa, Shibaura Institute of Technology H. Morita, Nano Film and Coat Laboratory LLC T. Inohara, LIPS-Works Co. Ltd</p> <p>740. Laser Polishing of 3D Printed Miniaturised Titanium Parts D. Bhaduri, P. Penchev, S.S. Dimov, University of Birmingham U. Harrysson, Digital Metal</p> <p>741. A new laser drilling method for producing high aspect ratio micro holes V. Nasrollahi, P. Penchev, S.S. Dimov, University of Birmingham</p> <p>744. On the development of a chip breaker in metal-matrix PCD insert A. Elkaseer, J. Lambarri, J.A. Sarasua, Tekniker</p>	<p>Session 8: Simulation/Modelling Chair: Samuel Bigot</p> <p>685. Experimental verification of drop impact test and analysis for mobile electronics B. Choi, H. Yeom, Y. Jeon, M.G. Lee, Ajou University</p> <p>698. Analytical Study on New Type of Porous Aerostatic Bearing K. Huang, H. Li, Y. Chen, K. Chien, MIRDC C. Liu, C. Yang, K. Huang, M. Chen, National Changhua University of Education</p> <p>709. Product cost modelling for micro-EDM drilling G. D'Urso, G. Maccarini, M. Quarto, C. Ravasio, Università degli Studi di Bergamo</p> <p>736. Friction and Elasto-plastic Property Modelling for Finite Element Analysis of Micro Extrusion Process H. Kitano, National Institute for Materials Science K. Dohda, J. Cao, Northwestern University</p>
<p>Time 17:15</p>	<p>Bus to Copenhagen</p>
<p>Time 18:00</p>	<p>Boat Tour</p>
<p>Time 19:00</p>	<p>Gala Dinner</p>

Time 9:00-9:45 • Room M1	
Plenary Session II Chair: Kornel Ehmann Invited Talk: "Solid-state electrochemical nanopatterning of silver and copper", Prof. Placid Ferreira, University of Illinois, USA	
Time 10:00-11:00	
Session 9: Advanced Materials and Processes I Chair: Joško Valentinčič 669. Plasma Nitriding of Inner Surfaces in the Mini- and Micro-Nozzles for Joining T. Aizawa, Shibaura Institute of Technology K. Wasa, TEC-DIA Co. Ltd 695. Estimate of power spectral density of discharge pulses in micro-EDM milling V. Marrocco, F. Modica, G. Guadagno, I. Fassi, ITIA CNR 706. Development of highly efficient combined polishing method for single-crystal silicon carbide T. Kurita, K. Miyake, K. Kawata, K. Ashida, T. Kato, AIST	Session 10: Injection Moulding II Chair: Steffen Scholz 689. Accurate validation of micro injection moulding process for manufacturing of a thin-wall micro part Q. Su, N. Zhang, M.D. Gilchrist, University College Dublin N. Symms, S4innovation Limited-Reseller for CoreTech System Co. Ltd 733. Design and fabrication of a mould with multiple inserts for a polymeric microfluidic device G.Trotta, F.Modica, I. Fassi, ITIA CNR A.Volpe, R.Martinez, A. Ancona, R.Osellame, IFN CNR 734. Impact of micro milling strategy on the demoulding forces in micro injection moulding D. Masato, M. Sorgato, G. Lucchetta, University of Padova P. Parenti, M. Annoni, Politecnico di Milano
Time 11:00-11:30 • M1 Foyer	
Coffee Break	
Time 11:30-13:00	
Session 11: Micro Parts' Assembly and Manipulation Chair: Irene Fassi 675. Towards Remote Telecontrol of a Desktop Microfactory via Internet Protocol with Virtual Reality T. Tiemerding, OFFIS M. Mikczinski, MiCROW GmbH S. Fatikow, University of Oldenburg 707. Diameter adaptive guides for wire based linked micro parts P. Wilhelmi, C. Schenck, B. Kuhfuss, University of Bremen 713. Programmable platform design and its electrodes activation algorithm for microparts motion G. Kritikou, N. Aspragathos, University of Patras 731. Strategies for micro-handling of solder balls for the automated reballing of BGA packages G. Fontana, S. Ruggeri, I. Fassi, ITIA CNR G. Legnani, University of Brescia	Session 12: Laser Processing II Chair: Iban Quintana 667. Influence of the Pulse Repetition Rate on the Hierarchical Features of Micro-Channels Fabricated by ns Lasers in Different Materials R. Jagdheesh, A. Tur, J.L. Ocaña, UPM 690. A thinner technology from thick to thin films microprocessing of microelectronics hybrids circuitry by laser precision trimming D. Ulieru, O.M. Ulieru, A.Topor, X. Vila, SITEX 45 SRL 699. Nanosecond Laser Milling of the Amorphous Alloy Zr41.2Ti13.8Cu12.5Ni10Be22.5 E.R. Williams, E.B. Brousseau, V.L. Keast, C.E. Hughes, K.D.M. Harris, Cardiff University N.P. Lavery, S. Mehraban, Swansea University 716. Laser-induced oxidation of titanium T. A. Jwad, S. Deng, H. Butt, S. Dimov, University of Birmingham
Time 13:00-14:00 • Glass Salen ground floor	
Lunch	
Time 14:00-15:00	
Session 13: Process Chains Chair: Giovanni Lucchetta 682. Development of metal MEMS manufacturing technologies using pierced metal foil and diffusion	Session 14: Micro Manufacturing II Chair: Emmanuel Brousseau 697. Ultrasonic-Assisted Incremental Microforming of Thin Shell Pyramids of Aluminum Foil

<p>bonding process at low temperature T. Shiratori, Y. Suzuki, T. Aihara, Komatsuseiki Kosakusho Co. Ltd S. Nakano, M. Katoh, National Institute of Advanced Industrial Science and Technology M. Yang, Tokyo Metropolitan University</p> <p>691. Effect of Residual Stress on the Distortion of Microembossed Metal Inserts for Assembly Injection Moulding P. Frey, C. Höhler, M. Merklein, FAU</p> <p>711. The post treatment process of additive manufacturing for intramedullary nail by ultrasonic vibration machining, abrasive flow machining, and electropolishing technology F. Hsu, T. Hung, Y. Lu, MIRDC Y. Liao, National Taiwan University S. Wang, Chung Yuan Christian University M. Lu, National Chung Hsing University H. Fu, National Kaohsiung University of Applied Sciences</p>	<p>T. Obikawa, M. Hayashi, University of Tokyo</p> <p>722. Xurography and lamination for manufacturing Point-of-Care (POC) micromixers J.I. Martínez-López, M. Mojica, H.A. Betancourt, C.A. Rodríguez, H.R. Siller, Tecnológico de Monterrey</p> <p>723. Corner Deposition On Near-Field Electrospinning For Pin-To-Pin And Pin-To-Plate Electrode Configurations N. Martinez-Prieto, J. Cao, K. Ehmman, Northwestern University</p>
<p>Time 15:00-15:30 • M1 Foyer</p>	
<p style="text-align: center;">Coffee Break</p>	
<p>Time 15:30-16:30</p>	
<p>Session 15: Machining II Chair: Massimiliano Annoni</p> <p>700. Study on the fabrication of hierarchical structure using a micro pyramidal tip with revolving trajectory B. Xue, Y. Yan, X. Zhao, Harbin Institute of Technology</p> <p>719. Single point diamond turning of injection moulding aluminium inserts for intraocular lens production X. Bazan, G. Cortazar, X. Mendibil, I. Quintana, Tekniker I. Martinez de la Pera, Aurrenak S. Coop</p> <p>724. Profile Evaluation of Radial Fresnel Lenses directly machined on Roller Moulds by Rotating-tool Diamond Turning R. Huang, X. Zhang, K. Liu, Singapore Institute of Manufacturing Technology S. Kumar, M. Rahman, National University of Singapore</p>	<p>Session 16: Advanced Materials and Processes II Chair: André Zimmermann</p> <p>708. A study of fluid flow characteristics using micro structured surfaces produced by WEDM M. Al-Fahham, S. Bigot, A.V. Medina, Cardiff University</p> <p>710. Development and characterization of functional polymer-ceramic composite structures using fused deposition modelling B. Khatrim K. Lappe, M. Habedank, C. Megnin, T. Hanemann, University of Freiburg T. Müller, KIT</p> <p>714. Fabrication of Micro DLC-Nozzles by Plasma Oxidation Printing T. Aizawa, Shibaura Institute of Technology K. Wasa, TEC-DIA Co. Ltd H. Tamagaki, KOBELCO Co. Ltd</p>

Time 9:00-10:15 • Room M1	
Plenary Session III	
Chair: Stefan Dimov	
Invited Talk: "Nanoimprint lithography: the (planar) world is not enough", Dr. Helmut Schiff, Paul Scherrer Institute, Switzerland	
Announcements:	
<ul style="list-style-type: none"> • World Congress on Micro and Nano Manufacturing 2017, Ming-Chyuan Lu, National Chung Hsing University, Taiwan • World Congress on Micro and Nano Manufacturing 2018, Joško Valentinčič, UoL, Slovenia 	
Time 10:15-10:45 • M1 Foyer	
Coffee Break	
Time 10:45-12:30	
<p>Session 17: Characterisation/Metrology Chair: Tatsuhiko Aizawa & Kim Carneiro</p> <p>681. Tolerance Verification of an Industrial Assembly using Computed Tomography A. Stolfi, L. De Chiffre, F. Regi, Technical University of Denmark</p> <p>684. Comparison of scatterometry, imaging scatterometry, AFM and confocal microscopy M. H. Madsen, J. S. Madsen, P. E. Hansen, Danish Fundamental Metrology A/S P. Boher, Universitetsparken 5 J. Nygård, Center for Quantum Devices & Nano-Science Center D. Dwarakanath, J. F. Jørgensen, Image Metrology A/S</p> <p>686. Real time effective dimensional verification of high throughput Nano-Embossing manufacturing M. Calaon, G. Tosello, H.N. Hansen, Technical University of Denmark P. Chamberlain, D. Hardt, MIT M.H. Madsen, Danish Fundamental Metrology A/S</p> <p>726. Investigation on the micromilled surface characterization through replica technology F. Baruffi, P. Parenti, F. Cacciato, M. Annoni, Politecnico di Milano G. Tosello, Technical University of Denmark</p> <p>738. Correction of systematic behaviour in topographical surface analysis D. Qualiotti, F. Baruffi, G. Tosello, R. Sobiecki, H.N. Hansen, Technical University of Denmark S. Gasparin, LEGO M. Annoni, P. Parenti, Politecnico di Milano</p>	<p>Session 18: Systems Chair: Ming-Chyuan Lu</p> <p>678. Investigations on Flexural Fatigue Strength of Conductor Paths Fabricated by LPKF-LDS® Technology H. Mueller, T. Groezinger, S. Weser, W. Eberhardt, A. Zimmermann, Hahn-Schikard M. Ketata, University of Stuttgart</p> <p>720. Design and manufacture of a flexure-based XYZ-force sensor J. Correa, N. Kapur, S. Kapoor, P.M. Ferreira, University of Illinois</p> <p>727. Development of a micro pump actuated by oxidative expansion of Fe powder H. Kan, T. Shimizu, M. Yang, Tokyo Metropolitan University</p> <p>729. Micro-Scale Tensile Fatigue Test System using a Micro-Manipulator with Scanning Electron Microscope K. Tsuchiya, N. Hayakawa, K. Fujimura, University of Tokyo T. Kakiuchi, Y. Uematsu, Gifu University</p> <p>737. Application of MEMS Microphone Array for Tool Wear Monitoring in Turning P. Wang, M. Lu, National Chung Hsing University S. Wang, Chung Yuan Christian University Y. Liao, Y. Tsai, National Taiwan University</p>
Time 12:30-14:00 • Glass Salen ground floor	
Lunch	
Time 14:00 - End of the 4M/IWMF2016 Conference	