Programme booklet

European Microbeam Analysis Society

EMAS 2019

16th EUROPEAN WORKSHOP on MODERN DEVELOPMENTS AND APPLICATIONS IN MICROBEAM ANALYSIS

19 to 23 May 2019 at the NTNU, Realfagbygget Trondheim, Norway

Organised in collaboration with: Norwegian University of Science and Technology (NTNU)

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AGENDA

19 May, 2019: Welcome and Opening

20 May, 2019: Modern Developments in Microbeam Analysis

21 May, 2019: Applications of Microbeam Analysis

22 May, 2019: Poster Session and Networking

23 May, 2019: Closing

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Welcome Address by the Chairperson of the Local Organising Committee

Dear Participant,

On behalf of the Local Organising Committee I have pleasure in inviting your company to participate in EMAS 2019, the 16th European Workshop on Developments and Applications in Microbeam Analysis, which will be held at the Realfagbygget (Natural Science building) of the Norwegian University of Science and Science (NTNU), Trondheim, Norway.

Trondheim is a famous Middle Age’s city in the centre of Norway with one of the most famous attractions being the Nidaros Dome and the river Nidelva running through the city centre. The river is famous for its good salmon fishing, which also takes place in the city centre and in June one sometimes can see and hear salmon jumping while enjoying refreshments in the local pubs. The Nidaros Dome is built from soapstone and is the most famous attraction in Trondheim. Trondheim is also situated right next to the large Trondheimsfjord, which hosts a rich population of fish and wild life such as small whales (porpoise) or even white tailed eagles.

The River Nidelva is situated quite close to the hotel accommodation and walking paths follow the river all the way through the city, from the famous wooden buildings in the city centre through the forest and the big dam of “Nedre Leirfossen”.

Though Trondheim is a medium sized city (190 464 inhabitants) it is closely surrounded by wild natural resorts, including Bymarka and Estenstadmarka, that are used for cross-country skiing in the winter (October/November-April/May) and hiking in the summer. The resorts host many of the common North Scandinavian animals, such as moose and small predators like lynx and foxes. The resort can be reached in less than 20 minutes by bus or train from the city centre.

We look forward to welcoming you to a scientific programme, which, in addition to the traditional fields, also includes techniques that are undergoing rapid development, such as micro-XRF and EBSD. You travelled from far away to Trondheim to meet your colleagues and to present your scientific highlights, for discussing problems and for starting new collaborations. The framework of the scientific exchange is given by the programme of the workshop, which covers a diversity of subjects starting on the first day with the a full day session on EBSD, which has undergone substantial new developments in recent years, followed by automated mineralogy, followed by a session about complimentary techniques with advanced combination of analytical techniques, automated mineralogy, X-ray fluorescence techniques, and finally recent advances and state of the art application of EPMA techniques.

Such a great event needs an engagement of active members of the Society. Firstly the Local Organising and International Scientific Committees would like to acknowledge Luc Van’t dack for the excellent support of setting up this workshop. His help was essential to the organisation of this well-prepared event.
We are grateful to the invited speakers who agreed to contribute to this workshop by giving talks and preparing a manuscript for the Book of Tutorials and Abstracts. One thing that we look particularly forward to is the traditional round-table discussions where the auditorium can contribute in a dialog with the invited speakers leaded by experts in the specific field.

I am also indebted to the exhibitors who will present the latest developments in scientific instrumentation and software in the exhibition area. Many of the companies are sustaining members of the society. With their support the society can continue its successful work. Special thanks are given to the sponsors of this event.

You are the actors of the success of the workshop as well. I encourage you to exchange your scientific problems and ideas with your international colleagues even if it is in front of the posters, during lunch or in the evening drinking a glass of wine or beer.

Bjørn E. Sørensen
Chair of EMAS 2019
EMAS President’s Address

As President of the European Microbeam Analysis Society it gives me great pleasure to welcome you all to Trondheim. This, the 16th EMAS European Workshop, is notable for several reasons: It is the first time that EMAS has visited Norway; it is the most northerly workshop we have held to date; and, since I will be stepping down at the AGM at this meeting, it is the last workshop that I will welcome as President of the Society. We are very grateful to our hosts, the NTNU, for giving us this opportunity to come to this beautiful part of the world. Scandinavia has a very active and knowledgeable microanalysis community and I look forward to some excellent presentation and discussions from both our local and international participants. I hope this is the first of many such workshops here.

I am delighted to welcome Rhonda Stroud, the President of the US MicroAnalysis Society (MAS), and Angus Netting the President of the Australian Microbeam Analysis Society (AMAS), as invited speakers. I also welcome the MAS and AMAS students, both of whom have won awards to be invited to present their work at this meeting. Our 3 societies maintain very strong ties, and we are able to offer significant and prestigious awards to the students at this meeting: the best presenter of the Young Scientists’ Session will receive an invitation to present at the 2020 M&M Meeting in the US, and the winner of the Student Poster Prize an invitation to the next AMAS conference in Australia. Both awards include free registration and travel support from the host society.

Finally, on behalf of the EMAS Board, I would like to thank to all those involved in organising this workshop, in particular Luc Van’t dack, our Society workshop organiser, and Bjørn Sørensen, the chair of both the Local Organising and International Scientific Committees. The Society is also indebted to our sustaining members, many of whom are exhibiting at the workshop, and to those who have provided direct sponsorship for the meeting. Without their generous support the registration costs would have been significantly higher.

The EMAS Workshops are an opportunity to catch up with old friends, make new friends, and learn new things in pleasant surroundings and company. I wish you an enjoyable and fruitful week in Trondheim.

Michael B. Matthews
EMAS President
European Microbeam Analysis Society

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  Trondheim, Norway

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PROGRAMME

Sunday 19 May 2019

09.00 - 13.00 : Short course: **Introduction to EBSD - part I.**
François Brisset (University of Paris-Sud, Institut de Chimie Moléculaire et des Matériaux d'Orsay, Orsay, France)
Jarle Hjelen (Norwegian University of Science and Technology (NTNU), Department of Materials Science and Engineering, Trondheim, Norway)
Bjørn E. Sørensen (Norwegian University of Science and Technology (NTNU), Department of Geoscience and Petroleum, Trondheim, Norway)

Short course: **Introduction to quantitative EDS X-ray microanalysis.**
Stuart L. Kearns (University of Bristol, School of Earth Sciences, Bristol, Great Britain)

Short course: **Quantitative compositional mapping by EPMA - An introduction to XMapTools software.**
Pierre Lanari (University of Bern, Institute of Geological Sciences, Bern, Switzerland)

Short course: **Introduction to transmission electron microscopy (TEM).**
Randi Holmestad (Norwegian University of Science and Technology (NTNU), Department of Physics, Trondheim, Norway)

14.00 - 18.00 : Short course: **Introduction to EBSD - part II.**

Short course: **Introduction to WDS X-ray microanalysis.**
Stuart L. Kearns (University of Bristol, School of Earth Sciences, Bristol, Great Britain)

Short course: **Monte Carlo simulation.**
Philippe T. Pinard (Oxford Instruments NanoAnalysis, High Wycombe, Great Britain)
Silvia Richter (R.W.T.H. Aachen, Central Facility for Electron Microscopy (GFE), Aachen, Germany)

Short course: **Electron probe maintenance.**
Richard Wührer (University of Western Sydney, Advanced Materials Characterisation Facility, Penrith, NSW, Australia)

19.00 - 20.00 : Registration

20.00 - 22.00 : Informal reception hosted by the International Scientific Committee and the Local Organising Committee
| Time  | Event                                                                                   |
|------|-----------------------------------------------------------------------------------------|
| 09.00| Welcome and opening address<br/>Michael B. MATTHEWS (President of EMAS)<br/>Bjørn Eske SØRENSEN (EMAS 2019 Workshop chairperson) |
| 09.15| About the reliability of EBSD measurements: Data enhancement.<br/>Gert NOLZE (Federal Institute for Materials Research and Testing (BAM), Department 5 - Materials Engineering, Berlin, Germany) |
| 10.00| A dictionary indexing approach for EBSD.<br/>Marc DE GRAEF (Carnegie Mellon University, Materials Science and Engineering Department, Pittsburgh, PA, U.S.A.) |
| 10.45| Refreshment break / Exhibition visit                                                    |
| 11.15| Presentation by the AMAS President: A multi-platform microanalysis approach to ore mineralogy: Advances and future prospects.<br/>Angus NETTING (University of Adelaide, Adelaide Microscopy, Adelaide, SA, Australia) |
| 11.45| Presentation by the AMAS Student Award Winner: From experiments to reaction mechanisms: Application of microbeam techniques to understand albitionisation reactions.<br/>Gan DUAN (Monash University, School of Earth, Atmosphere and Environment, Clayton, VIC, Australia) |
| 12.00| Lunch break / Exhibition visit                                                           |
| 13.30| Presentation of new equipment and software by the exhibiting companies.<br/>chairpersons:<br/>Jan-Pieter VERMEULEN (Micro to Nano, Haarlem, The Netherlands)<br/>Xavier LLOVET (University of Barcelona, Scientific and Technological Centers (CCiT), Barcelona, Spain) |
| 15.30| Oral presentations of the contributed posters: I.<br/>chairperson:<br/>Philipp PÖML (European Commission, JRC Directorate G - Nuclear Safety and Security, Karlsruhe, Germany) |
| 16.30| Poster session I / Refreshment break                                                     |
| 17.00| Recent features in EBSD, including new trapezoidal correction for multi-mapping.<br/>Bjørn E. SØRENSEN (Norwegian University of Science and Science (NTNU), Department of Geoscience and Petroleum, Trondheim, Norway) |
| 17.45| Advances in electron channelling contrast imaging and electron backscatter diffraction for imaging and analysis of structural defects in the scanning electron microscope.<br/>Carol TRAGER-COWAN (University of Strathclyde, Department of Physics, SUPA, Glasgow, Great Britain) |
| 18.30| Round-table discussion:<br/>* Electron backscatter diffraction (EBSD).<br/>chairpersons: François BRISSET (University of Paris-Sud, Institut de Chimie Moléculaire et des Matériaux d’Orsay, Orsay, France)<br/>Enrico LANGER (Technical University of Dresden, Institute of Solid State Physics, Dresden, Germany) |
PROGRAMME

Tuesday 21 May 2019

09.00 : Oral presentations of the contributed posters: II.
   chairperson: Stuart L. KEARNS (University of Bristol, School of Earth Sciences, Bristol, Great Britain)

10.00 : Poster session II / Refreshment break

10.45 : Young scientists' session.
   chairperson: Bjørn Eske SØRENSEN (Norwegian University of Technology and Science (NTNU), Department of Geoscience and Petroleum, Trondheim, Norway)

12.15 : Presentation by the MAS-USA President: Nanodiamonds from Earth to the Cosmos.
   Rhonda STROUD (Naval Research Laboratory, Materials Science and Technology Division, Nanoscale Materials Section, Washington D.C., U.S.A.)

12.45 : Presentation by the MAS-USA Student award winner: Probing the native structure and chemistry of Li-metal batteries by cryo-electron microscopy.
   Michael ZACHMANN (Oak Ridge National Laboratory, Center for Nanophase Materials Sciences, Oak Ridge, TN, U.S.A.)

13.00 : Lunch break / Exhibition visit

14.30 : Exploring Mars at the nanoscale: Applications of transmission electron microscopy and atom probe tomography in planetary exploration.
   Luke DALY (University of Glasgow, Dept. Geographical and Earth Sciences, Glasgow, Great Britain)

15.15 : EPMA, Raman and XANES applied for the study of oxidation processes in glass.
   Ery C. HUGHES (University of Bristol, School of Earth sciences, Bristol, Great Britain)

16.00 : Refreshment break / Exhibition visit

16.30 : New horizons in quantitative compositional mapping – Analytical conditions and data reduction using XMAPTOOLS.
   Pierre LANARI (University of Bern, Institute of Geological Sciences, Bern, Switzerland)

17.15 : Using complementary micro-analytical techniques to analyse diamond anvil cell experiments.
   Eleonor JENNINGS (University of London, Department of Earth and Planetary Sciences, London, Great Britain)

18.00 : Round-table discussion:
   * Complementary techniques.
   chairpersons: Kurt AASLY (Norwegian University of Science and Science (NTNU), Department of Geoscience and Petroleum, Trondheim, Norway)
   Hans DIJKSTRA (Thermo Fisher Scientific BV, Breda, The Netherlands)
**PROGRAMME**

**Wednesday 22 May 2019**

| Time  | Event                                                                                     |
|-------|-------------------------------------------------------------------------------------------|
| 09.00 | **Oral presentations of the contributed posters: III.**<br>chairperson: Fernanda GUIMARÃES (Laboratório Nacional de Energia e Geologia, I.P., Laboratório Ciência e Tecnologia Mineral, S. Mamede de Infesta, Portugal) |
| 10.00 | **Poster session III / Refreshment break**                                                 |
| 10.45 | **Upscaling of 2D mineralogical information to 3D volumes for geoscience applications using a multi-scale, multi-modal and multi-dimensional approach.**<br>Alan BUTCHER (Geological Survey of Finland (GTK), Geomaterials and Applied Mineralogy, Espoo, Finland) |
| 11.30 | **Applications of automated mineralogy.**<br>Thomas AIGSPERGER (Luleå University of Technology, Div. Geosciences and Environmental Engineering, Luleå, Sweden) |
| 12.15 | **Round-table discussion:**<br>Automated mineralogy.<br>chairperson: Maarten A.T.M. BROEKMAN (Geological Survey of Norway, Mineral Resources / Laboratory, Trondheim, Norway) |
| 13.00 | **Lunch break / Exhibition visit**                                                        |
| 14.30 | **EMAS Annual General Meeting**                                                           |
| 15.15 | **A deeper insight into materials: Potentials and limitations of µ XRF.**<br>Roald TAGLE (Bruker Nano GmbH, Berlin, Germany) |
| 16.00 | **Refreshment / Exhibition visit**                                                        |
| 16.30 | **SI traceable characterisation of nanomaterials by X-ray spectrometry.**<br>Burkhard BECKHOFF (Physikalisch-Technische Bundesanstalt (PTB), X-ray Spectrometry, Berlin, Germany) |
| 17.15 | **Round-table discussion:**<br>µ-X-ray fluorescence.<br>chairperson: Silvia RICHTER (RWTH Aachen, Gemeinschaftslabor für Elektronenmikroskopie (GFE), Aachen, Germany) |
| 19.30 | **Workshop dinner at the Banksalen hall, Trondheim.**<br>Awards ceremony.                  |
| Time | Session |
|------|---------|
| 09:00 | Recent progresses in soft X-ray emission spectroscopy.  
*Masami TERAUCHI* (Tohoku University, Inst. Multidisciplinary Research for Advanced Materials, Sendai, Japan) |
| 09:45 | Spatial resolution limits of EPMA.  
*Ben BUSE* (University of Bristol, School of Earth Sciences, Bristol, Great Britain) |
| 10:30 | Contribution by a Honorary Membership recipient. |
| 10:50 | Refreshment break |
| 11:10 | Development and validation of standardless and standards-based X-ray microanalysis.  
*Philippe T. PINARD* (Oxford Instruments NanoAnalysis Ltd., High Wycombe, Great Britain) |
| 11:55 | U-Th-Pb<sub>total</sub> dating of REE-phosphate by electron microprobe: Review and progress.  
*Julien M. ALLAZ* (Eidgenössische Technische Hochschule, Institut für Geochemie und Petrologie, Zürich, Switzerland) |
| 12:40 | Round-table discussion:  
*Electron probe microanalysis (EPMA)*  
chairpersons:  
*Kristian DRIVENES* (Norwegian University of Technology and Science (NTNU), Department of Geoscience and Petroleum, Trondheim, Norway)  
*Xavier LLOVET* (University of Barcelona, Scientific and Technological Centers (CCIT), Barcelona, Spain) |
| 13:40 | Concluding remarks |
 PROGRAMME

Monday 20 May 2019

13.30 - 15.30: **Presentation of new equipment and software by the exhibiting companies.**

chairpersons: Jan-Pieter VERMEULEN (Micro to Nano, Haarlem, The Netherlands)
Xavier LLOVET (University of Barcelona, Centres Científics i Tecnològics (CCiT), Barcelona, Spain)

- **EM-Tec sample holders - Interface between sample and instrument.**
  Jack VERMEULEN (Micro to Nano, Haarlem, The Netherlands)

- **The APEX of EDS and EBSD data collection and analysis.**
  René DE KLOE (Ametek BV, EDAX Business Unit, Tilburg, The Netherlands)

- **Presentation of the new SXFive-TACTIS electron probe microanalyser.**
  Anne-Sophie ROBBES (Ametek, CAMECA Business Unit, Gennevilliers, France)

- **Probe Software: How to improve sensitivity, accuracy and throughput in your laboratory.**
  Anette VON DER HANDT. (for: Probe Software, Inc., Eugene, OR, U.S.A.)

- **Bruker microanalysis product presentation.**
  Michael ANDERSSON (Bruker Nordic AB, Solna, Sweden)

- **Analytical application of Soft X-ray emission spectroscopy (SXES).**
  Serguei MATVEEV (JEOL (Germany) GmbH, Freising, Germany)

- **Powering the future of 3D materials characterisation using Xe FIB.**
  Jiri DLUHOS (TESCAN ORSAY HOLDING a.s., Brno, Czech Republic)
15.30 - 16.30 : Oral presentations of the contributed posters: I.

chairperson: Philipp PÖML (European Commission, JRC Directorate G - Nuclear Safety and Security, Karlsruhe, Germany)

- Processing and indexing of electron backscatter patterns using open source software.
  H.W. Ånes, J. Hjelen, A.T.J. van Helvoort and K. Martinsen

- EBSD-like orientation mapping in TEM - New possibilities.
  M. Bieda-Niemiec, K. Kudłacz, A. Jarzębska, S. Boczkal, P. Koprowski, M. Faryna and K. Sztwiertnia

- 3D-EBSD analysis of grain boundary structures in copper and aluminium deformed by channel die pressing.
  P. Bobrowski and A. Tarasek

- Austenite-ferrite transformation of AISI 430 ferritic stainless steel during its manufacturing.
  I. Collado Garcia, A. Núñez Galindo, A. Ruiz Flores, J.F. Almagro Bello and J. Botana

- Characterisation of super duplex stainless steel by optimisation of EBSD parameters.
  M. Haukali, I. Westermann, M. Karlsen, Yu, R. de Kloe and J. Hjelen

- Using ECCI and EBSD to study the microstructure of hardmetals.
  B.M. Jablon, K. Mingard, G. Naresh-Kumar and C. Trager-Cowan

- Analysis of the polycrystalline microstructure of Al 3at%Mg 0.2at%Sc alloy by 3D-EBSD.
  J. Kopeczek, L. Klimša, J. Staněk, F. Seifl, V. Beneš, D. Westhoff, L. Petrich, C. E. Krill III and V. Schmidt

- Strain analysis and twin domains in Phalaborwa baddeleyite characterised by EBSD, RTKD and TEM.
  M.E. Lee, W.E. Goosen and J.H. O’Connell

- Evolution of crystalline orientations in the production of ferritic stainless steel.
  A. Núñez Galindo, I. Collado, D.L. Sales and J.F. Almagro Bello

- EBSD investigations applied to characterise the crystallographic relationships at the interfaces of biocomposite mollusc shells.
  M. Strag, M. Bieda-Niemiec, K. Berent, K. Nalepka, A. Jarzębska, A.G. Checa and K. Sztwiertnia
09.00 - 10.00 : **Oral presentations of the contributed posters: II.**

chairperson: Stuart L. KEARNS (University of Bristol, School of Earth Sciences, Bristol, Great Britain)

- Application of the adjoint method in gradient-based optimisation to the M1-model in electron beam microanalysis.
  *T. Claus, J. Bünger, S. Richter and M. Torrilhon*

- Characterisation of magmatic-hydrothermal tourmaline from the Land’s End granite - Going from metres to micrometres.
  *K. Drivenes, W. Brownscombe, R.B. Larsen, R. Seltmann, J. Spratt and B.E. Sørensen*

- Analysis of light elements in carbon-coated samples using soft X-ray emission spectrometry: First results on lithium and boron.
  *S. Goldmann and C. Wöhrl*

- Matlab-based algorithm associated with the CAMECA SX100 electron microprobe for fast and precise (re-)exploration and re-measurement of documented samples.
  *J. Haifler and R. Škoda*

- Molybdenum homogenisation in γ-U(Mo) alloy atomized particles.
  *X. Iltis, V. Klosek, R. Belin, K. Hanifi, E. Suard, J. Drnec and H. Palancher*

- Silicon drift detector incorporated into a wavelength-dispersive X-ray spectrometer (SD-WDS) – Allowing bremsstrahlung determination by theoretical calcul.
  *K. Moran and R. Wuhrer*

- XRD and EPMA characterisation of serpentinite from Tuscany (Italy).
  *A.P. Santo, E. Pecchioni and C.A. Garzonio*

- Calibration device for accurate current measurement on a CAMECA SX100 EPM.
  *B. Vos and A. Leenaers*

- Electron probe microanalysis of non-safety tested and safety tested irradiated TRISO AGR-2 nuclear fuel.
  *K.E. Wright and I. Van Rooyen*
10.45 - 12.15 : Young Scientists' Session.

chairperson: Bjørn Eske SØRENSEN (Norwegian University of Technology and Science (NTNU), Department of Geoscience and Petroleum, Trondheim, Norway)

- Local tetragonality of martensite investigated by EBSD.
  Grzegorz Cios, A. Winkelmann, G. Nolze, T. Tokarski and P. Bala (AGH - University of Science and Technology, Krakow, Poland)

- Austenite-ferrite transformation of AISI 430 ferritic stainless steel during its manufacturing.
  Irene Collado Garcia, A. Nuñez Galindo, A. Ruiz Flores, J.F. Almagro Bello and J. Botana (University of Cádiz, Laboratorio de Corrosión y Protección, ESI, Puerto Real, Spain)

- Identification of crystal structures and elemental composition of reactive air-brazed Ba$_{0.5}$Sr$_{0.5}$Co$_{0.8}$Fe$_{0.2}$O$_3$-$\Delta$-Ag-14CuO joints by EBSD, EPMA and analytical TEM.
  Lisa C. Ehle, S. Herzog, S. Richter, A. Kaletsch, C. Broeckmann and J. Mayer (RWTH University, Central Facility for Electron Microscopy, Aachen, Germany)

- In situ SEM study of lithium metal batteries.
  Maryam Golozar, H. Demers, R. Gauvin and K. Zaghib (McGill University, Department of Mining and Materials Engineering, Montreal, Québec, Canada)

- Analysis of oxide scales on oxidised AISI 441 ferritic stainless steel catalyst support by scanning electron microscopy.
  Pablo Navarro Vicente, A. Nuñez Galindo, J.F. Almagro Bello and J.A. Odriozola (Acerinox S.A., Departamento I+D+I, Los Barrios, Spain)

- Automated orientation imaging and phase mapping in the TEM: Detection limits for reliable martensite identification in steel.
  Jonas Werner and T.E. Weirich (RWTH Aachen, Central Facility for Electron Microscopy, Aachen, Germany)
09.00 - 10.00 : Oral presentations of the contributed posters: III.

chairperson: Fernanda GUIMARAES (Laboratório Nacional de Energia e Geologia, I.P., Laboratório Ciência e Tecnologia Mineral, S. Mamede de Infesta, Portugal)

- Ga FIB/TOF-SIMS analysis of lithium materials.
  S. Bessette, M. Golozar, P. Hovington, R. Gauvin and K. Zaghib

- Versatility of X-ray microanalysis in examinations of forensic cases.
  Z. Brożek-Mucha

- An X-ray micro-fluorescence spectrometry analysis for determination of bromine content in alkaline rocks.
  C.F. Faranda, I. Di Carlo, B. Scaillet and J. Andujar

- Characterisation of Li-ion batteries by combined LM, CT, EDS, WDS and SIMS using helium-ion microscopy (Carl Zeiss Orion).
  U. Golla-Schindler, F. Khanom, D. Zeibig, A. Casares, P. Gnauck, T. Bernthaler and G. Schneider

- Measurement of elemental composition of FeNi and SiGe alloy thin films by EPMA and µ-XRF.
  V.-D. Hodoroaba, R. Terborg, S. Boehm and K.J. Kim

- Characterisation of precipitates in a 12 % Cr tempered martensite ferritic steel.
  G. Marx, W.E. Goosen and J.E. Westraadt

- Characterisation of carbide-reinforced composite surface layers on a ductile cast iron.
  K. Matus and D. Janicki

- Characterising nanowire arrays by computer vision based on SEM images.
  A.B. Mosberg, D. Ren, S. Myklebost, H. Weman, B.-O. Fimland and A. van Helvoort

- TEM characterisation and Raman spectroscopy of vitrinite.
  S. Vranjes-Wessely, D. Misch, D. Kiener, G. Rantitsch, D. Gross and R.F. Sachsenhofer

- TEM studies on Fe-Co-B soft magnetic melt spun ribbons.
  A. Wojcik, W. Maziarz, M. Kowalczyk, J. Ferenc, P. Zackiewicz and A. Kolano-Burian
Programme booklet

European Microbeam Analysis Society

EMAS 2019

16th EUROPEAN WORKSHOP

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