

The International Metrological Conference



September 16-18, 2024, Kielce

Conference Programme

16th of September



September 16-18, 2024, Kielce

11:00-12:00	Registration (Binkowski Hotel)
12:00-12:30	Opening Ceremony Chairman: Andrzej Kurkiewicz
12:30-13:30	General Session I Chairman: Andrzej Kurkiewicz Keynote Speaker: Miruna DOBRE, <i>Advancing metrology through EU-funded research: achievements and challenges</i> Keynote Speaker: Beata GODLEWSKA-ŻYŁKIEWICZ, <i>Nanometrology for food analysis</i>
13:30-14:30	Lunch
14:30-15:30	General Session II Chairman: Paweł Chrapowicki Keynote Speaker: Aimé LAY-EKUAKILLE, <i>Radio imaging instrumentation quality control for maintenance: metrological characterization for hardware and outcomes processing</i> Keynote Speaker: Luca DE VITO, <i>Compressed sensing-based data acquisition: an opportunity for distributed systems, IoT and diagnostics</i>
15:30-17:00	Special Session I – Polish Metrology Program (part A) Chairman: Michał Wieczorowski Speakers: Jakub Karasiński, University of Warsaw, (et al.): <i>Ensuring traceability in the certification of isotopic reference materials</i> Magdalena Zawada-Michałowska, Lublin University of Technology: <i>Identification of long-term needs and directions of strategic activities for the development of Polish metrology</i> Tomasz Bartkowiak, Poznan University of Technology (et al.): <i>On the characterization of freeform surfaces created by selective laser melting – a re-entrant story</i> Janusz Fidelus, Central Office of Measures: <i>Fabrication and characterization of nanostructures for calibration of scanning probe microscopes – compendium</i> Tomasz Jankowiak, Poznan University of Technology (et al.): <i>Challenges in fast dynamic laboratory testing</i> Nataliya Hots, Ukrainian Academy of Metrology (et al.): <i>Ukrainian Academy of Metrology structure and activities</i> - Guest Presentation

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17:00-17:30

Tutorial I

Chairman: Paweł Chrapowicki

Speakers: Dariusz BRZOZOWSKI, Mateusz MATUSZAK, *Laser scanning implementation in the automation of measurement processes*

17:30-18:00

Tutorial II

Chairman: Paweł Chrapowicki

Speaker: Dominik SZAŁA, *Automation of coordinate measurements in quality control*

18:00-19:30

Special Session I – Polish Metrology Program (part B)

Chairman: Bartosz Gapiński

Speakers:

Danuta Owczarek, Cracow University of Technology (et al.): *The influence of the object matting process at various air compression values on the accuracy of coordinate optical measurement*

Witold Habrat, Rzeszow University of Technology (et al.): *Metrological challenges of measuring thermomechanical effects on the surface layer condition in the machining of light aircraft alloys*

Michał Kalisiak, Warsaw University of Technology (et al.): *Multistate meniscus-removal algorithms for broadband microwave dielectric-permittivity measurement of liquids*

Dariusz Litwin, Łukasiewicz Research Network – Tele and Radio Research Institute (et al.): *Multiwavelength approach to step height standards*

Sebastian Sławski, Silesian University of Technology (et al.): *Measurement of the properties of the blast wave generated by various explosive*

Paweł Pioś, The University College of Applied Sciences in Chelm (et al.): *Construction of blind signal processing algorithms based on the geometric structure of information*

18:00-19:30

Meeting of the Machine Building Committee of the Polish Academy of Sciences

Chairman: Mirosław Pajor

20:00-24:00

Gala dinner

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9:00-9:30

Registration

9:30-11:00

Special Session II (part A)

Chairman: Grzegorz Królczyk

Speakers:

Włodzimierz Makiela, Kielce University of Technology (et al.): *Preparation of Świętokrzyskie Laboratory Campus of the Central Office of Measures stations for conducting accredited activities*

Jacek Świdorski, Kielce University of Technology (et al.): *Validation of the geodetic instrument testing station at Świętokrzyskie Laboratory Campus of the Central Office of Measures*

Krzysztof Gębarski, SMARTTECH Sp. z o.o. (et al.): *Importance of color information captured by optical measurement systems (3d scanners) for quality control and maintenance planning*

Witold Siemieniako, Hexagon: *Comparative analysis of the measurement uncertainty budget of high-performance and high-quality laser scanners used on CMMs*

Tadeusz Szumiata, Casimir Pulaski University of Radom (et al.): *New kilogram, mass nanometrology and challenges for Poland*

Leszek Radziszewski, Kielce University of Technology (et al.): *Equivalent Sound Level Sensitivity Factor Analysis*

Olga Kolečka, Czestochowa University of Technology (et al.): *Assessment of the structural condition of composite materials based on ferromagnetic materials using a magnetic field camera and a thermal imaging camera*

9:30-11:00

Special Session II (part B)

Chairman: Witold Habrat

Speakers:

Mariusz R. Rząsa, Opole University of Technology: *3D peripheral object scanning method for X-Ray tomograph*

Ruslan Nikonkov, Institute of Low Temperature and Structural Research, PAN (et al.): *INTiBS in project "Dissemination of the redefined kelvin" of the European Metrology Partnership's*

Karol Krawczyk, Kielce University of Technology/Central Office of Measures (et al.): *Research on the possibility of using the M1 calibration base for checking total stations in the laboratory of new technologies of time and length of the ŚKLGUM*

Urszula Błaszczak, Białystok University of Technology (et al.): *An LED-based CIE-A illuminant for photometric applications*

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Jacek Puchalski, Central Office of Measures: *Fit of nonlinear curves to measurement points using the total weighted least squares method in an approximate linear model*

Paweł Fotowicz, Central Office of Measures: *A new definition of measurement uncertainty in the context of the GUM approach for evaluation of measurement data*

Maciej Gruszczyński, Central Office of Measures (et al.): *Time and Length Department: The importance of reliable time and frequency signal distribution services in the modern digital industry: a case study of the e-CzasPL project*

11.00-14.00 **Visit to the Świętokrzyskie Laboratory Campus of the Central Office of Measures**

14.00-15.00 **Lunch**

15:00-16:30 **General Session II**
Chairman: Paweł Chrapowicki

Keynote Speaker: Harald W. SCHOLZ, *How the Joint Research Centre supports EU policies with pre-normative research, and why cooperation with Metrological Institutions, Academia and Member States' Research Centres is welcomed*

Keynote Speaker: Zbigniew HUMIENNY, *Why does a metrologist need geometrical tolerances on product design drawing?*

Keynote Speaker: Piotr SOBECKI, *Measuring the invisible: harnessing explainable AI to reveal hidden Patterns*

16:30-17:30 **Tutorial III**
Chairman: Magdalena Zawada-Michałowska

Speaker: Robert SOWIŃSKI, *Training Path for coordinate metrologist*

Tutorial IV
Chairman: Magdalena Zawada-Michałowska

Speaker: Piotr ORLIK, *Capture high quality process data from your CNC Controller*

17:30-19:30 **Visit the National Museum in Kielce**

20.00-22.00 **Dinner**

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8:00-8:30	Registration
8:30-9:30	Poster session Chairman: Paweł Chrapowicki
9:30-11:00	Special Session III Chairman: Tadeusz Szumiata Speakers: Grzegorz Skorulski, Białystok University of Technology (et al.): <i>Measurements using piezoelectric pressure transducers in the analysis of contact stress distributions in extrusion processes</i> Andrzej Łukaszewicz, Białystok University of Technology (et al.): <i>Determination of cutting forces in the process of conventional and trochoidal milling using a strain gauge measuring platform</i> Tomasz Ryba, CKZiU no. 2, Radom: <i>Controlling tension and wear device of belts rubber in the conveyors</i> Krzysztof Ciecieląg, Lublin University of Technology: <i>Analysis of feed force and recurrence quantifications during drilling of polymer composites with glass, carbon and aramid fibers</i> Agnieszka Skoczylas, Lublin University of Technology (et al.): <i>Study of the effect of pre-treatment on the properties of the surface layer of objects after vibratory shot peening</i> Michał Lelęć, Lublin University of Technology (et al.): <i>Microscopic examination of surface morphology and geometric features of aluminum-silicon multilayer structures under various Water Jet cutting conditions</i>
11:00-11:30	Closing ceremony
11.30-12.30	Lunch

POSTER SESSION

18th of September 8:30-9:30

Chairman: Paweł Chrapowicki



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- 1 ***The concept of an electronic seat control system***
Mariusz Duk¹, Paulina Zeliszezwska-Duk²
¹Department of Electronics and Information Technology, Lublin University of Technology
²Department of Horse Breeding and Use, University of Life Sciences in Lublin
- 2 ***Characterization of surface nanostructures of natural samples for calibration measurements***
Arkadiusz Foks¹, Dariusz Banaś¹, Paweł Jagodziński^{1,2}, Aldona-Kubala-Kukuś¹, Ilona Stabrawa¹
¹Institute of Physics, Jan Kochanowski University, Kielce, Poland
²Central Office of Measures
- 3 ***Determination of the dielectric permittivity spectrum of rapeseeds depending on their ripening stage***
Jacek Majcher¹, Marcin Kafarski², Agnieszka Szyplowska², Małgorzata Budzeń², Andrzej Wilczek²
¹Department of Electrical Engineering and Smart Technologies, Lublin University of Technology
²Institute of Agrophysics Polish Academy of Sciences
- 4 ***High-precision small-angle measurement interferometer based system***
M. Grzyb¹, D. Czulek², M. Gruszczyński², P. Sosinowski², P. Jagodziński³
¹University of Technology, Kielce / Central Office of Measures
²Central Office of Measures
³Jan Kochanowski University, Kielce / Central Office of Measures
- 5 ***Application of machine learning in optimization of coordinate measurement strategies***
Jakub Rzeczkowski, Aleksander Czajka, Sylwester Samborski, Mariusz Kłonica
Department of Production Engineering, Lublin University of Technology
- 6 ***Accuracy of thin-walled elements manufactured with end mills of different stiffnesses***
Paweł Pieško¹, Magdalena Zawada-Michałowska¹, Kamil Anasiewicz¹, Ewelina Kosicka²
¹Department of Production Engineering, Lublin University of Technology
²Department of Information Technology and Robotics in Production Engineering,
Lublin University of Technology
- 7 ***Day boundary discontinuity in GNSS clock products: scale and magnitude***
Aleksandra Maciejewska, Kamil Maciuk
Department of Integrated Geodesy and Cartography, AGH University of Krakow
- 8 ***Seasonal annual and semiannual oscillations of the permanent GNSS stations' time series. A global analysis***
Aleksandra Maciejewska, Kamil Maciuk
Department of Integrated Geodesy and Cartography, AGH University of Krakow

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9 ***SPM piezoresistive cantilevers calibration***

Dariusz Czulek¹, Piotr Sosinowski¹, Teodor Gotszalk², Dominik Badura², Ivo Rangelow³,
Zbigniew Siejda¹, Grzegorz Budzyń², Virpi Korpalainen⁴

¹Central Office of Measures

²Electronics and Photonics, Wrocław University of Science and Technology

³Institute of Micro and Nanoelectronics, Ilmenau University of Technology;

⁴VTT MIKES Metrology, Espoo, Finland

10 ***Zdolności pomiarowe stanowiska Parametrów Klimatu ŚKLGUM w Kielcach***

Karolina Bębacz¹, Rafał Jarosz²

¹Świętokrzyski Kampus Laboratoryjny Głównego Urzędu Miar,

²Główny Urząd Miar

11 ***Pomiar przewodności cieplnej izolatorów na aparacie HFM 446M***

Robert Kaniowski, Rafał Jarosz, Marek Kozicki

Central Office of Measures

12 ***Acoustic Sensor's Range Evaluation***

Roman Kochan¹, Nataliya Hots², Jerzy Józwik³, Anton Kitsera¹, Oleksii Siechko¹, Dariusz Mika⁴

¹Department of Specialized Computer Systems, Lviv Polytechnic National University

²Department of Measuring Information Technology, Lviv Polytechnic National University

³Department of Production Engineering, Mechanical Engineering Faculty,
Lublin University of Technology

⁴The Institute of Technical Sciences and Aviation, The University College of Applied Sciences in Chelm

13 ***An in vitro method for testing burn wound healing using a microheater***

Andrzej Kociubiński

Department of Electronics and Information Technology, Lublin University of Technology

14 ***The new model of conduction-cooled current leads for superconducting fault current limiters***

Michał Majka

Department of Electrical Equipment and High Voltage Techniques, Lublin University of Technology

15 ***Measurements of physicochemical parameters of fresh juice after atmospheric pressure plasma conditioning***

Dawid Zarzeczny¹, Joanna Pawlat¹, Piotr Terebun¹, Michał Kwiatkowski¹, Agnieszka Starek-Wójcicka²,
Marta Krajewska²

¹Department of Electrical Engineering and Smart Technologies, Lublin University of Technology

²Department of Biological Bases of Food and Feed Technologies, University of Life Sciences in Lublin

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- 16 ***Primary teeth enamel after non thermal plasma treatment***
Joanna Pawłat¹, Michał Kwiatkowski¹, Piotr Terebun¹, Dawid Zarzeczny¹, Monika Machoy², Agnieszka Mazur-Lesz³, Elżbieta Grządka⁴, Agnieszka Starek-Wójcicka⁵, Marta Krajewska⁵, Nobuya Hayashi⁶
¹Department of Electrotechnic and Smart Technologies, Lublin University of Technology
²Pomeranian Medical University, Department of Periodontology
³Private Dental Office, Szczecin
⁴Institute of Chemical Sciences, Maria Curie-Skłodowska University
⁵Department of Biological Bases of Food and Feed Technologies, University of Life Sciences in Lublin
⁶Interdisciplinary Graduate School of Engineering Sciences, Kyushu University, Japan
- 17 ***Method for metrological identification of damage parameters in materials of biological origin***
Serhii Kharchenko¹, Mariusz Kłonica², Sylwester Samborski², Farida Kharchenko³
¹Department of Applied Mechanics, Lublin University of Technology
²Department of Production Engineering, Lublin University of Technology
³Department of Agricultural Engineering, Sumy National Agrarian University
- 18 ***Simplified approach to measurements of unmanned ground vehicle dynamics using on-board sensors***
Marek Nowakowski
Military Institute of Armoured and Automotive Technology
- 19 ***Atmospheric pressure plasma jets for polymeric surfaces' conditioning***
Michał Kwiatkowski¹, Piotr Terebun¹, Dawid Zarzeczny¹, Joanna Pawłat¹, Tomoyuki Murakami², Narumol Matsuyama³
¹Department of Electrotechnic and Smart Technologies, Lublin University of Technology
²Department of Science and Technology, Seikei University, Japan
³Department of Civil Engineering and Architecture, Saga University, Japan
- 20 ***Preparation and characterization of nanostructures for scanning probe microscopes***
Marta Goliszek-Chabros, Aldona Nowicka, Krzysztof Skrzypiec, Weronika Sofińska-Chmiel, Urszula Maciołek
Analytical Laboratory, Maria Curie-Skłodowska University
- 21 ***Adaptation of measurement methods to metrological requirements for dosimetric equipment used in the Polish Armed Forces***
Artur Czapski, Marek Natora
Department of Dosimetry and Contamination Detection Systems, Military Institute of Chemistry and Radiometry

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- 22** *Geometric structure of the surface after milling of a thin-walled element made of a selected titanium alloy*
Ewelina Kosicka¹, Magdalena Zawada-Michałowska², Paweł Pieško², Kamil Anasiewicz²
¹Department of Information Technology and Robotics in Production Engineering, Lublin University of Technology
²Department of Production Engineering, Lublin University of Technology
- 23** *General procedure for implementation of hybrid measuring systems consisting of tactile and optical measuring systems*
Adam Gąska¹, Wiktor Harmatys¹, Maciej Gruza¹, Jerzy Sładek¹, Tomasz Kowaluk², Adam Styk², Małgorzata Kujawińska², Michał Jakubowicz³, Michał Wieczorowski³, Krzysztof Stępień⁴, Piotr Gąska⁵, Adam Wójtowicz⁶, Mariusz Wiśniewski⁶
¹Faculty of Mechanical Engineering, Cracow University of Technology
²Faculty of Mechatronics, Warsaw University of Technology
³Faculty of Mechanical Engineering, Poznan University of Technology
⁴Faculty of Mechatronics and Mechanical Engineering, Kielce University of Technology
⁵Faculty of Mechanical Engineering and Robotics, AGH University
⁶Time and Length Department, Central Office of Measures
- 24** *Measurement of the dielectric permittivity spectrum with use of different measurement techniques*
Marcin Kafarski¹, Małgorzata Budzeń¹, Agnieszka Szyplowska¹, Andrzej Wilczek¹, Arkadiusz Lewandowski², Jacek Majcher³, Marcin Lewak⁴,
¹Institute of Agrophysics Polish Academy of Sciences
²Institute of Electronic Systems, Warsaw University of Technology
³Department of Electrical Engineering and Smart Technologies, Lublin University of Technology
⁴E-test Sp. z o.o.
- 25** *Dielectric spectroscopy as a valuable tool for monitoring soil behavior under different conditions*
Małgorzata Budzeń¹, Marcin Kafarski¹, Agnieszka Szyplowska¹, Andrzej Wilczek¹, Arkadiusz Lewandowski², Marcin Lewak³, Jacek Majcher⁴
¹Institute of Agrophysics, Polish Academy of Sciences,
²Institute of Electronic Systems, Warsaw University of Technology
³E-test Sp. z o.o
⁴Department of Electrical Engineering and Smart Technologies, Lublin University of Technology
- 26** *Study on the direction-dependent accuracy of identification of the stylus contact point during measurement with coordinate measure machine (CMM)*
Michał Jakubowicz¹, Tomasz Mazur², Mirosław Rucki², Zbigniew Siemiątkowski², Michał Wieczorowski¹
¹Poznan University of Technology
²Casimir Pulaski Radom University

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- 27 The new measurement system of an electric field for aircraft**
Joanna Michałowska, Paweł Tomiło
The University College of Applied Sciences in Chelm
- 28 Comparative analysis of shot peening and brushing on edge condition and surface layer properties**
Jakub Matuszak
Department of Production Engineering, Lublin University of Technology
- 29 Functional properties of coating systems for military technology applications**
Marek Michalski¹, Norbert Radek²
¹F.H. Barwa
²Kielce University of Technology
- 30 The new measurement system of an electric field for aircraft**
Joanna Michałowska¹, Paweł Tomiło²
¹Faculty of Electrical Engineering and Computer Science, Lublin University of Technology
²Faculty of Management, Lublin University of Technology
- 31 Next-Gen Surface Metrology: Deep Learning for Decision-Making Support and Parameter Prediction**
Dawid Kucharski¹, Adam Gąska², Tomasz Kowaluk³, Krzysztof Stępień⁴, Michał Wieczorowski¹,
Bartosz Gapiński¹, Michał Nawotka⁵, Marta Rępańska³, Piotr Sobecki⁵, Piotr Sosinowski⁵, Jan Tomasiak³,
Adam Wójtowicz⁵
¹Institute of Mechanical Technology, Poznan University of Technology
²Laboratory of Coordinate Metrology, Cracow University of Technology
³Institute of Metrology and Biomedical Engineering, Warsaw University of Technology
⁴Department of Metrology and Non-conventional Manufacturing Methods, Kielce University
of Technology
⁵Central Office of Measures, Warsaw
- 32 Opracowanie metodyki badań i analiz SGP przedmiotów wykonanych z materiałów o różnej refleksyjności**
Magdalena Niemczewska-Wójcik¹, Danuta Owczarek¹, Monika Madej², Jolanta Królczyk³,
Piotr Niesłony³, Grzegorz Królczyk³, Michał Jakubowicz⁴, Bartosz Gapiński⁴, Michał Wieczorowski⁴,
Kamil Kubiak⁵, Piotr Sosinowski⁵
¹Faculty of Mechanical Engineering, Cracow University of Technology
²Faculty of Mechatronics and Mechanical Engineering, Kielce University of Technology
³Faculty of Mechanical Engineering, Opole University of Technology
⁴Faculty of Mechanical Engineering, Poznan University of Technology
⁵Central Office of Measures

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- 33 Wykorzystanie impulsowej metody echa do pomiarów przepływów woda - powietrze w przewodach poziomych i pionowych**
Elżbieta Wróblewska, Wiesław Wędrychowicz, Piotr Synowiec, Piotr Piechota, Artur Andruszkiewicz, Grzegorz Betkier
Faculty of Mechanical and Power Engineering Wrocław University of Science and Technology
- 34 Charakterystyka wypaleń spektrometrem w stopach stali**
Adrian Dera, Szymon Witczak
Polytechnic Faculty, The President Stanislaw Wojciechowski Calisia University
- 35 Measurement of selected beverages' properties after non thermal plasma treatment**
Piotr Terebun¹, Michał Kwiatkowski¹, Dawid Zarzeczny¹, Joanna Pawłat¹, Elżbieta Grządka², Agnieszka Starek-Wójcicka³, Marta Krajewska³
¹Department of Electrotechnic and Smart Technologies, Lublin University of Technology
²Institute of Chemical Sciences, Maria Curie-Skłodowska University
³Department of Biological Bases of Food and Feed Technologies, University of Life Sciences in Lublin
- 36 From Thermal Voltage Converter to Quantum Standard - Development of AC Voltage Standards**
Paweł Zawadzki, Patryk Bruszewski, Witold Rządkiwicz
Central Office of Measures
- 37 DIG-MAN: Integration of digital tools into product development and manufacturing education. Results of the project**
Marek Magdziak, Roman Wdowik
Rzeszow University of Technology
- 38 Research-based education: perspective in metrology**
Roman Wdowik, Marek Magdziak
Rzeszow University of Technology
- 39 Quantitative phase imaging techniques application in biological studies**
Michał Arabski^{1,2}, Katarzyna Gałczyńska^{1,2}, Aneta Węgierek-Ciuk¹, Sławomir Wąsik^{3,2}, Maria Baczewska⁴, Arkadiusz Kuś⁴, Oleg Łyżwiński⁴, Paula Ortega^{5,6}, Francisco Javier de la Mata^{5,6,7}, Dariusz Czulek², Małgorzata Kujawińska^{4,2}
¹Institute of Biology, Jan Kochanowski University
²Central Office of Measures
³Institute of Physics, Jan Kochanowski University
⁴Institute of Micromechanics and Photonics, Warsaw University of Technology
⁵Department of Organic and Inorganic Chemistry, University of Alcalá
⁶Institute Ramón y Cajal for Health Research, Madrid, Spain
⁷Networking Research Center on Bioengineering, Biomaterials and Nanomedicine

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- 40 Influence of tire assembling machine on tire radial force variation factor and possibilities of it's separation**
Marcin Moskwa^{1,2}, Bartosz Gapiński¹, Michał Jakubowicz¹, Michał Wieczorowski¹
¹Poznan University of Technology, Faculty of Mechanical Engineering,
²Bridgestone Poznań Sp. z o.o
- 41 Identification of the position of the kinematic center of the rotary axis of a 5-axis machine tool with the R-Test system**
Daria Salamacha, Jerzy Józwik, Paweł Pieśko
Department of Production Engineering, Lublin University of Technology
- 42 Developing a Plant Matrix Reference Material: Certified Metals and Microplastics in Leaves and Fruit for Measurement Traceability**
Jakub Karasiński¹, Anna Ruszczyńska¹, Andrzej Gawor¹, Andrii Tupys¹, Dariusz Banaś²,
Aldona Kubala-Kukuś², Michał Strzelec³, Beata Warzywoda³, Ryszard Dobrowolski⁴,
Joanna Dobrzyńska⁴, Joanna Reszko-Zygmunt⁴
¹Faculty of Chemistry, Biological and Chemical Research Center, University of Warsaw
²Faculty of Exact and Natural Sciences, Jan Kochanowski University
³Physical Chemistry and Environment Department, Central Office of Measures
⁴Faculty of Chemistry, Maria Curie-Skłodowska University
- 43 Developing a Multifunctional Polish Waters Reference Material: Certified Metals, Iones, and Microplastics for Measurement Traceability**
Anna Ruszczyńska¹, Jakub Karasiński¹, Andrzej Gawor¹, Marcin Wojciechowski¹, Dariusz Banaś²,
Aldona Kubala-Kukuś², Joanna Dumańska³, Anna Bojanowska-Czajka³
¹Faculty of Chemistry, Biological and Chemical Research Center, University of Warsaw
²Faculty of Exact and Natural Sciences, Jan Kochanowski University
³Physical Chemistry and Environment Department, Central Office of Measures