# BOOK OF ABSTRACTS

SEPTEMBER 14-18 — OLOMOUC, CZECH REPUBLIC

CZECH–SLOVAK SPECTROSCOPIC CONFERENCE

September 14-18, 2026

msms

Mössbauer Spectroscopy in Materials Science 2026

Ioannes Marcus Marci Spectroscopic Society

Faculty of Science

Palacký University Olomouc

SMALT

JSVTS



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# ABOUT THE CONFERENCE

The **19th Czech - Slovak Spectroscopic Conference (19th CSSC)** is a scientific meeting with international participation to share recent developments, exchange ideas, explore new directions and initiate a possible collaboration in the analytical spectrometry area. Leading scientists and researchers will be invited to present their most up-to-date results at this conference, to exchange exciting ideas and experiences, and to explore future development. The aim of this scientific event is to bring together experts from universities, academia, official centres, various laboratories, and industry, to summarize the current progress in various areas of spectroscopy/spectrometry and the trends in the applications such as chemical, environmental, geological, biological, food, pharmaceutical and industrial materials and to stimulate contacts and mutual exchange of experiences and ideas.

A series of specialised colloquia entitled **Mössbauer Spectroscopy in Material Science (MSMS)** was initiated in Central Europe. They have been regularly organised since 1994, alternatively in Slovakia and the Czech Republic, with a two-year periodicity. Firstly, MSMS colloquium represents an important forum for researchers in materials science who share their results on understanding the solid-state matter employing Mössbauer spectroscopy. Secondly, the conference organisers invite several scientists well distinguished in Mössbauer spectroscopy worldwide to give both tutorial lectures and lectures of broad perspective to convey the knowledge to young generation (researcher beginners, PhD students, etc.). Thirdly, cutting-edge works are presented, stimulating future studies and research orientation in the field of Mössbauer spectroscopy.

The microsymposium entitled **Advances in vibrational spectroscopy - Celebrating 60 years of Raman spectroscopy** in our country and dedicated to the memory of Bohuslav Strauch is the inherent part of the Conference program as a parallel session. Invited as well as short lectures within this Microsymposium will cover a wide range of topics targeted on the current advances in Raman and infrared spectroscopy and their applications. In the focus of interest will be time-resolved IR and Raman spectroscopy as well as special methods of Raman spectroscopy, namely resonance Raman scattering (RRS), and surface-enhanced /resonance/ Raman scattering (SERS and SERRS). Additionally, the development and applications of advanced techniques of vibrational spectroscopic imaging and mapping both on the micro- and the nano-scale will be covered. Furthermore, applications of IR and Raman spectroscopy in chemistry, material science, geology, gemmology, art conservation, environmental science, food processing, biology and medicine will be an inherent part of the Microsymposium scope.

# CSSC & MSMS COMMITTEES

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| Tomáš Vašina | Ioannes Marcus Marci Spectroscopic Society, Czech Republic |

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# PROGRAMME

| Monday 14.9. | Registration desk |
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| 16:00 – 19:00 | Registration |
| 18:00 – 22:00 | Welcome drink |

| | Tuesday 15.9. | | Room 2.001 |
|---|---|---|---|
| | 8:30 – 9:00 | | Opening |
| Chair: Milde | **9:00 – 9:50** | **Kanický** | **The Early Development of ICP Optical Spectrometry in Czechoslovakia: From the First Instruments to Modern Plasma spectrometry** |
| | 9:50 – 10:20 | Holá | LA-ICP-MS for Strategic Raw Materials: From Laser-Sample Interactions to Trace Element Analysis, Imaging and New Glass Calibration Materials |
| | 10:20 – 10:40 | Pragolab | |
| | 10:40 – 11:00 | Coffee break | |
| Chair: Machala | 11:00 – 11.30 | Dubiel | Impact of Magnetism on Lattice Vibrations |
| | 11:30 – 11:50 | Georgiadis | Carbon-Encapsulated $Fe_3C$ Nanoparticles Formed During CVD on AlSi 1095 High-Carbon Steel |
| | 11:50 – 12:10 | Andrýsková | Nanostructured Cobalt Ferrite Thin Layers Preapred by Thermally Induced Decomposition of Oxalates |
| | 12:10 – 12:30 | Kudor | $^{57}$Fe and $^{151}$Eu Mössbauer and XRD Study of Eu-Doped Goethite Nano-Composites Prepared from Different Eu-Compound Precurzors |
| | 12:30 – 13:00 | Wang | Operando Mössbauer Spectroscopy for Single-Atom Electrocatalysts |
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| | 13:30 – 14:45 | Lunch | |
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| | 15:15 – 15:35 | Černá | Layer-by-Layer Defect Analysis of He-Ion-Irradiated $MoS_2$ |
| | 15:35 – 15:55 | Kubala | Mean Fluorescence Lifetime |
| | 15:55 – 16:15 | Papoušková | Extending Ambient Mass Spectrometry Using Deep-UV Laser-Based Ionization Approach |
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| | 16:35 – 16:55 | Palounek | Concurrent Characterization of Plasmonic Hot Spot, Molecular Structure and Molecular Mass |
| | 17:45 – 18:00 | Group photo | |
| | 18:00 – 19:30 | Poster session | |

| | Tuesday 15.9. | | Room 2.005 |
|---|---|---|---|
| | | | |
| | 10:40 – 11:00 | Coffee break | |
| Chair: Ozaki | 11:00 – 11.30 | Frank | Novel Physicochemical Phenomena in Graphene Revealed by Microdroplet In-situ Raman Spectroelectrochemistry |
| | 11:30 – 12:00 | Kalbáč | UHV Exfoliation and Spectroscopy of 2D Materials |
| | 12:00 – 12:30 | Kalbáčová Vejpravová | New Frontiers in Raman Spectroscopy of 2D Materials: Isotope Engineering and Twisted Light |
| | 12:30 – 13:00 | Profant | Towards Robust Quantitative Raman Spectroscopy: From FIngerprints to Thermodynamics |
| | 13:00 – 13:30 | Němec | Molecular Materials for Nonlinear Optics: An Integrated Approach to Phase Characterisation |
| | 13:30 – 14:45 | Lunch | |
| Chair: Marques | 14:45 – 15:15 | Žůrková | FT-IR Spectroscopy for The Non-Invasive Analysis of Paintings |
| | 15:15 – 15:45 | Mojzeš | Raman Microscopy of Crystalline Inclusions in Microalgae |
| | 15:45 – 16:15 | Kapitán | Experimental Development of Raman Optical Activity in Olomouc – Celebrating 30 Years of ROA in Our Country |
| | 16:15 – 16:45 | Kaminsky | Advanced Vibrational Spectroscopy for Chiral Solid-State Pharmaceuticals |
| | 16:45 – 17:15 | Tabor | From Molecular Vibrations to Catalytic Function: FTIR Spectroscopy in Action |
| | 17:15 – 17:45 | Matějka | Nanoscale Imaging and Nano-FTIR Spectroscopy of Surface Nano-Thin Polydopamine Films – What Is The Role of Deposition Time and Substrate Material? |
| | 17:45 – 18:00 | Group photo | |
| | 18:00 – 19:30 | Poster session | |

| Wednesday 16.9. | | Room 2.001 |
|---|---|---|
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| 9:50 – 10:10 | Klimiček | Modern Approach to Raman Microscopy – RAMANTouch |
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| 11:30 – 11:50 | Machala | Molybdenum-Modified Iron Oxides as Catalysts for Degradation of Meropenem by Peroxydisulfate |
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| 12:30 – 13:00 | Šepelák | Local Structural Disorder–Magnetism Relationships in Nanostructured Complex Oxides |
| 13:00 – 14:15 | Lunch | |
| 14:30 | Excursion | |

| Wednesday 16.9. | | Room 2.005 |
|---|---|---|
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| 11:00 – 11:30 | Sunil | Plasmonic Nanoparticles Anchored Electrospun FIbres as Non-Invasive SERS Platforms for Mass Screening of Cancer Biomarkers |
| 11:30 – 12:00 | Anucha | Compositional Exploration of Au and Ag Bimetal Alloy Colloids for SERS Detection of Methylene Blue and Chlorpyrifos in Water |
| 12:00 – 12:30 | Švecová | Towards Reliable Cu-SERS: Transforming Reactive Copper into Stable Platforms |
| 12:30 – 12:50 | Kukralová | Preparation and SERS Utilisation of Chiral Golden Nanoparticles |
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| 13:00 – 14:15 | Lunch | |
| 14:30 | Excursion | |

# EXCURSION (WEDNESDAY, SEPTEMBER 16)

## A guided tour through the historical Olomouc

Olomouc, often referred to as the city with the second-largest historical reserve in the Czech Republic (after Prague), which includes the Holy Trinity Column, a UNESCO World Heritage Site, is definitely worth visiting. Our professional guides will show you the city's highlights and tell you about the history of the second-oldest university in Czechia. In registration form you can choose guide in Czech or in English.


## ZOO Olomouc

Zoo Olomouc (Svatý Kopeček, the Holy Hill) is located near Olomouc, Czech Republic, housing over 1,700 animals across 350 species, including unique safari-style exhibits and a 32-meter viewing tower. You will need to get there by public transport. An enthusiastic zoologist will welcome us and guide us through the public and backstage parts of the Zoo, founded in 1952.

ZOOOLOMOUC

## Rope centre

If you are up for sports activities during the week full of lectures and scientific discussions, you can enjoy a program in Rope centre Proud called EXPERIENCE, suitable for groups who just want to climb rope obstacles, have fun, and relax from work stress. For those who are afraid of heights, we will find another way to enjoy themselves. You will need to use public transport to reach the rope center.

Lanové centrum PROUD

| Thursday 17.9. | | Room 2.001 |
|---|---|---|
| Chair: Procházka | | |
| **8:30 – 9:20** | **Ozaki** | **Advances in Semiconductor SERS** |
| 9:20 – 9:40 | Pěgřimočová | Quantitative Mineralogical Analysis of Sedimentary Rocks Using Far-IR Spectroscopy |
| 9:40 – 10:00 | Horák | MTM – Beyond the Diffraction Limit: Advanced Photothermal Spectroscopy Techniques |
| 10:00 – 10:20 | Tulupová | Combination of SERS and Enzymatic Detection – Introduction of 4D Space for Interference Overcoming |
| 10:20 – 10:40 | Coffee break | |
| Chair: Šepelák | | |
| 10:40 – 11:10 | Klencsár | Key Insights Into MossWinn 5.0 |
| 11:10 – 11:30 | Yaroslavtsev | What's New in Syncmoss – Faster and Smarter Mössbauer Analysis |
| 11:30 – 11:50 | Procházka | Doppler Modulator for Synchotron Mössbauer Spectroscopy |
| 11:50 – 12:10 | Hausner | Observation of Ultrasonically Generated X-Ray Pulses from Resonantly Excited 57-Fe Nuclei |
| 12:10 – 12:30 | Kouřil | Oltwins Tenbeam: A Multi-Beam Mössbauer Spectrometer Towards Higher Efficiency of Measurement |
| 12:30 – 12:50 | Dubiel | Distribution of Cr Atoms in Selected Strained and Strain-Free Fe-Cr Alloys |
| 13:10 – 14:30 | Lunch | |
| Chair: Holá | | |
| 14:30 – 15:00 | Musil | Photochemical Vapor Generation Coupled with ICP-MS and DART-HRMS: From Highly Sensitive Determination to Volatile Species Identification and Back Again |
| 15:00 – 15:20 | Wahlen | Enhancing Helium Collision and Reaction Cell Modes with A Novel Cell Design for ICP-MS |
| 15:20 – 15:40 | Gregar | Beyond Elemental Certification: Exploring Food CRMs for Nanoparticle Characterization |
| 15:40 – 16:00 | Fouček | Multi-Analytical Spectroscopic Investigation of Roman-Provincial and Germanic Knee Brooches from The Central Danube Region |
| 16:00 – 16:20 | Gibbs | At The Mercy of Sensitivity and Matrix Effects: Quantification of Fluorine and Oxygen in Polymers with Laser-Induced Breakdown Spectroscopy |
| 16:20 – 16:40 | Nyaba | Application of Nickel Iron Layered Double Hydroxides/Activated Carbon (NiFe-LDH@AC) Composite for Preconcentration and Removal of Cr and As from Water Systems |
| 16:40 – 17:00 | Vaculovič | LA-ICP-MS as An Effective Tool for Studying The Fate of Metals in Organisms |
| 17:00 – 19:00 | Optional visit to Fort Science | |
| 19:00 – 01:00 | Conference dinner in Fort Science | |

| Thursday 17.9. | | Room 2.005 |
|---|---|---|
| | | |
| 10:20 – 10:40 | Coffee break | |
| Chair: Schlücker | | |
| 10:40 – 11:10 | Procházka | Beyond Conventional Plasmonics: Next-Generation Materials for Surface-Enhanced Raman Scattering (SERS) Spectroscopy |
| 11:10 – 11:40 | Kočišová | Multifunctional Hybrid Metal Oxide/Metal Platforms for Surface-Enhanced Raman Scattering (SERS): Combining High Sensitivity with Recyclability |
| 11:40 – 12:10 | Dendisová | Electrochemical SERS as A Tool for Studying Molecule-Plasmonic Surface Interactions |
| 12:10 – 12:40 | Kopal | Underestimated Region: High-Order SERS Transitions Reveal Surface Complex Formation |
| 12:40 – 13:10 | Piliarik | Nanoscopic Optical Tracking of The Dynamics of Single Molecules via Elastic and Inelastic Scattering |
| 13:10 – 14:30 | Lunch | |
| | | |
| 17:00 – 19:00 | Optional visit to Fort Science | |
| 19:00 – 01:00 | Conference dinner in Fort Science | |

| Friday 18.9. | | Room 2.001 |
|---|---|---|
| Chair: Šišková | | |
| 9:00 – 9:30 | Guarrotxena | Beyond Single-Analyte Detection: SERS for Multiplexed Biosensing and Bioimaging |
| 9:30 – 9:50 | Pavelka | Spike Annihilator: Life Without Spikes |
| 9:50 – 10:20 | Marques | Advancing Cancer Therapy by Vibrational Spectroscopy – New Drugs and Targets |
| 10:20 – 10:50 | Schünemann | The Mössbauer Effect Can Be Used for More Than Just Detecting The Electronic and Dynamic Properties of Iron Centers in Proteins |
| 10:50 – 11:00 | Closing ceremony | |
| 11:00 – 11:30 | Farewell drink | |

# SERS DETECTION AND MAGNETIC REMOVAL OF SELECTED POLLUTANTS FROM WATER USING BIMETALLIC NANOCOMPOSITES

Karolína ŠIŠKOVÁ[1], Radek OSTRUSZKA[1], Hoang Yen NGUYENOVÁ[1], Katarzyna BYS[2], Mariusz UCHMAN[2]

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Surface enhanced Raman scattering (SERS) spectroscopy has been known for several decades already. Frequently, noble metal nanoparticles and their designed morphologies were successfully used for detection of biomolecules and/or environmental pollutants dissolved at very low concentrations in aqueous solutions [1]. Albeit SERS is frequently regarded as an irreproducible analytical method due to complexity of surface chemistry, it still holds perspective of a robust and reliable analytical tool [2]. When plasmonic nanoparticles are combined into one nanocomposite with magnetic particles, it can be exploited not only for species SERS detection, but also for its permanent removal from aqueous solution due to magnetic field application. This is exactly the main topic of our contribution: indeed, smart polymers containing boronic acid in its structure and/or mercaptophenylboronic acid molecules are attached to plasmonic Au nanoparticles that were generated at the surface of magnetic particles in the previous step. Therefore, bimetallic nanocomposites enveloped by functional surface coating (an organic shell) are employed as SERS-active, magnetically-driven platforms enabling sensitive spectroscopic detection and magnetic separation of selected species. It is challenging task, especially using 785 nm excitation laser line. The successful applicability of bimetallic nanocomposites has been proven in the case of charged porphyrins so far. There is an outlook of selected antibiotics and/or hormones unambiguous spectroscopic detection in aqueous solution via the above-mentioned functional surface modification of our bimetallic nanocomposites.

*References*

[1] B. Vlčková, I. Pavel, M. Sládková, K. Šišková, M. Šlouf, Single molecule SERS: Perspectives of analytical applications, *J. Mol. Struct.* 834-836, (2007), 42-47
[2] C. Deriu, L. Fabris, A surface chemistry perspective on SERS: revisiting the basics to push the field forward, *Chem. Soc. Rev.* 54, (2025) 5224

*Acknowledgements*

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