



Ing. Lívia Mačák, PhD

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● ABOUT ME

I work as an Assistant Professor in Materials Engineering with extensive experience in materials research, analysis, and characterization. My professional activities involve the use of advanced laboratory techniques and instrumentation, with a specialization in the characterization of optical, chemical, morphological, and structural properties of materials. I possess advanced skills in interpreting experimental data, including results obtained from UV-Vis spectrophotometry, FTIR spectroscopy, transmission electron microscopy (TEM), and scanning electron microscopy (SEM). I am also experienced in other analytical methods such as X-ray diffraction (XRD) and energy-dispersive X-ray spectroscopy (EDX).

My research focuses on the design and implementation of experiments, data processing and evaluation, and the preparation of materials for scientific publications. I actively participate in research projects aimed at improving material properties and exploring their potential applications.

My knowledge and expertise are oriented toward achieving practical, measurable results and addressing real research challenges. I regularly present my findings at national and international scientific conferences, contributing to professional networking and dissemination of research outcomes.

In addition to research, I am also engaged in teaching activities, supervising laboratory courses and student projects, which supports the development of the next generation of professionals in the field of materials engineering.

Research Metrics

- **H-index (WoS/Scopus):** 5 / 5
- **Scientific publications (WoS/Scopus):** 9 / 9
- **Citations (WoS/Scopus):** 96 / 112
- **Conference contributions (domestic / international):** 6 / 5

WoS ID: GPK-4094-2022

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SCOPUS ID: 57782657500

● WORK EXPERIENCE

🏢 TECHNICAL UNIVERSITY OF KOŠICE, FACULTY OF MATERIALS, METALLURGY AND RECYCLING – SLOVAKIA

PHD STUDENT – 01/09/2021 – 31/08/2025

The study and preparation of noble metal nanoparticles includes their synthesis and characterization using techniques such as UV-Vis spectrophotometry, TEM, SEM, and FTIR spectroscopy, with the aim of analyzing their morphological, optical, and chemical properties.



EDUCATIONAL ACTIVITIES

Teaching Activities

- **Nanomaterials** – laboratory courses focused on the synthesis, characterization, and applications of nanostructured materials.
- **Composite Materials** – laboratory exercises focused on the preparation, analysis, and evaluation of composite material properties.
- **Materials for Renewable and Nuclear Energy** – lectures and practical sessions focused on advanced materials used in renewable energy systems.

Authorship of Educational Materials

- **2023 – Nanomaterials I** – co-author of a university textbook focused on theoretical and practical aspects of nanomaterials research and applications.

🏢 SIXNET INTERNET TECHNOLOGIES S.R.O. – KOŠICE, SLOVAKIA

PROJECT MANAGER – 01/05/2016 – 31/08/2018

- Project administration and management within the company
- Participation in the EU Creative Voucher and Creative Industry grant schemes
- Communication and controlling of the project team

🏢 **SK EXPRESS S.R.O.** – KOŠICE, SLOVAKIA

HR ASSISTANT – 01/03/2012 – 31/10/2015

- Administration and management of HR department tasks
- Participation in EU employment support grant schemes for youth and disadvantaged groups
- Administrative processes related to HR department activities

● **EDUCATION AND TRAINING**

2021 – 2025 Košice

PHD.- MATERIALS SCIENCE Technical University of Košice

2012 Košice, Slovakia

ING.- WASTE PROCESSING AND RECYCLING Technical University of Košice

● **LANGUAGE SKILLS**

Mother tongue(s): **SLOVAK**

Other language(s): **ENGLISH**

● **PUBLICATIONS**

Publications for the period 2021-2025

- Velgosová O., Mačák L.: *Nanomateriály*. Monografia, Technická univerzita v Košiciach, 2023.
- Mačák L., Velgosová O.: *Príprava polymérnych nanokompozitov dopovaných kovovými nanočasticami*. Zborník príspevkov, Metalurgia Junior 2022, Košice, 2022.
- Mačák L., Velgosová O.: *Príprava nanočastíc striebra chemickou a biologickou syntézou*. Zborník TUKE, 2023.
- Ondrašovičová J., Zigo Silva, Farkašová Z., Zahumenická J., Velgosová O., Mačák L.: *Antibakteriálna účinnosť strieborných nanočastíc pripravených pomocou extraktu z listov levandule*. Zborník vedeckých prác – Bezpečnosť a kvalita potravín, 2024.
- Mačák L., Velgosová O.: *Nanočastice striebra pripravené pomocou chemickej a biologickej syntézy, komerčne zakúpené nanočastice a ich súčasné použitie ako koloidné roztoky*. Zborník TUKE, 2024.
- Velgosová O., Mačák L., Lisnichuk M., Vojtko M.: *Synthesis and analysis of polymorphic silver nanoparticles and their incorporation into the polymer matrix*. Polymers (MDPI), 2022.
- Velgosová O., Mačák L., Zdráhalová E., Mara V.: *Influence of reagents on the synthesis process and shape of silver nanoparticles*. Materials (MDPI), 2022.
- Velgosová O., Mačák L., Mudrá E., Vojtko M., Lisnichuk M.: *Preparation, structure, and properties of AgNPs-enhanced nanocomposites*. Polymers (MDPI), 2023.
- Mačák L., Velgosová O., Dolinská S.: *Transfer of AgNPs' Anti-Biofilm Activity into the Nontoxic Polymer Matrix*. Materials (MDPI), 2023.
- Mačák L., Velgosová O., Dolinská S.: *Impact of Two Lavender Extracts on Silver Nanoparticle Synthesis and the Study of Nanoparticles' Antibiofilm Properties and Their Ability to Transfer them into a Nontoxic Polymer*. Micro (MDPI), 2023.
- Velgosová O., Mačák L., Mara V., Mudrá E., Lisnichuk M., Čižmárová E.: *The Influence of Reagents on the Shape, Stability, and Toxicity of AgNPs and Their Use to Produce Polymer-AgNPs Composites*. Metals (MDPI), 2023.
- Mačák L., Velgosová O., Čižmárová E.: *Synthesis of Differently Shaped Nanotriangular AgNPs Stabilized by PVP*. Evolutions in Mechanical Engineering, 2024.
- Velgosová O., Dolinská S., Mačák L., Čižmárová E.: *Impact of Plant Extract Phytochemicals on the Synthesis of Silver Nanoparticles*. Polymers (MDPI), 2024.
- Mačák L., Velgosová O., Mudrá E., Vojtko M., Kromka F.: *Preparation of green silver nanoparticles and eco-friendly polymer-AgNPs nanocomposites as a study of toxic properties across multiple organisms*. Polymers (MDPI), 2024.
- Mačák L., Velgosová O.: *Príprava strieborných nanočastíc striebra chemickou a biologickou syntézou*. Czech Chemical Society Symposium Series, 2024.
- Ondrašovičová J., Velgosová O., Mačák L., Zahumenická J., Pecka-Kielb E., Vargová M., Rehan I.F.: *Green synthesis of silver nanoparticles and their inhibitory effects on resistant udder pathogens*. Journal of Applied Animal Research, 2025.

● CONFERENCES AND SEMINARS

15/11/2022 – 19/11/2022 Rome - Italy

4th International Conference on Biopolymers and Bioplastics

Presentation - Lívia Mačák: "Green Synthesis of Silver Nanoparticles and their Incorporation into Polymer Matrix"

26/08/2024 – 29/08/2024 Ostrava, Czech republic

76. Sjezd chemiků - VŠB-TUO

Lívia Mačák: „Syntéza strieborných nanočastíc“

19/05/2025 – 22/05/2025 VŠB-TUO, Ostrava, Czech republic

NANOOstrava 2025 – Energy & Environment

Lívia Mačák: "From Nanoparticles to Functional Materials: Production and Integration of AgNPs into Polymer Matrix"

Herľany, Slovakia

Metalurgy Junior 2022 - 2025

Conference Contributions

 **2022 – Contribution:** Preparation of polymer nanocomposites doped with metallic nanoparticles

 **2023 – Contribution:** Preparation of polymer nanocomposites doped with metallic nanoparticles

 **2024 – Contribution:** Silver nanoparticles synthesized via chemical and biological methods

 **2025 – Contribution:** Synthesis of nanoparticles and preparation of polymer matrix nanocomposites

● PROJECTS

2022 – 2024

VEGA 1/0020/22 – Development and analysis of properties of progressive polymer matrix composites doped with silver nanoparticles for sensors and antibacterial applications

member of the research team.

2022 – 2024

KEGA 009TUKE-4/2023 Creation of aids for materials engineering education using IT resources for Industry 4.0

member of the research team.

2025 – 2028

KEGA 011TUKE-4/2025: Modern Materials for Energy: Innovative Education to Improve the Quality of Teaching in Materials Engineering Subjects

member of the research team.

● HONOURS AND AWARDS

15/11/2022

Certificate – Coalesce Research Group

The certificate confirms that Lívia Mačák from the Technical University of Košice received recognition for her oral presentation with the paper "Green Synthesis of Silver Nanoparticles and their Incorporation into Polymer Matrix" at the 4th International Conference on Biopolymers and Bioplastics, which took place on November 14–15, 2022 in Rome, Italy.

23/05/2022

Completed course – Technical University of Košice, Institute of Languages, Social Sciences and Academic Sports

Pedagogical minimum for doctoral students, academic year: 2021/2022, 30 hours

Form: continuing education within TUKE

26/10/2023

Certificate – Autumn Professional Seminar Series – Pragolab - Banská Bystrica, Slovakia

Participation in a professional seminar as part of the autumn cycle of professional seminars

07/11/2024

Certificate of Presentation

Presentation entitled "Nanocomposites Silver nanoparticles incorporated in polymer matrix"
Faculty of Materials Engineering, Silesian University of Technology, Katowice, Poland (within the Erasmus program)

22/05/2025

Certificate of Attendance – NanoOstrava 2025 – VŠB – Technical university Ostrava, Czech republic

Oral and poster presentation on the topic "Preparation of polymer nanocomposites with silver nanoparticles"

Poster NanoOstrava 2025

2nd place in the competition for the best scientific poster at the international conference NanoOstrava 2025 (Ostrava, Czech Republic), May 21, 2025.

Best paper at the MJ 2025 conference

Award for the best contribution at the scientific conference of doctoral students METALURGIA JUNIOR 2025, organized by the Faculty of Materials, Metallurgy and Recycling of the Technical University of Košice, on May 8, 2025.

MOBILITY

ERASMUS+

Mobility within the framework of the ERASMUS+ program:

- Silesian University of Technology, Faculty of Materials Engineering, Department of Production Engineering (Katowice, Poland) - 04.- 15. November 2024
- Université Cheikh Anta Diop de Dakar (UCAD) Senegal (Africa) - 25. April - 02. May 2025