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Employment and positions

Łukasz Maj, PhD is employed since 2018 as Assistant Professor at Institute of Metallurgy and Materials Science, Polish Academy of Sciences. Since 2019 - expert in Strength Testing Laboratory (L-1) and Laboratory of Analytical Electron Microscopy (L-2).

Scientific career

MSc: AGH University of Krakow, Faculty of Physics and Applied Computer Science, Krakow, Poland, 2014 (with honors)
PhD: Institute of Metallurgy and Materials Science, Polish Academy of Sciences, Krakow, Poland, 2018 (with honors)

Scientific achievements

86 published scientific articles (**80** of them cited by Journal Citation Reports (JCR)) and **3** book chapters

The most relevant publications during last 5 years

1.

Ł. Maj, F. Muhaffel, A. Jarzębska, A. Trelka, K. Trembecka-Wójciga, J. Kawałko, M. Kulczyk, M. Bieda, H Çimenoğlu, Enhancing tribological performance of MAO coatings through hydrostatic extrusion of cp-Ti substrate, Journal of Alloys and Compounds 1010 (2025) 178246

2.

Ł. Maj, A. Trelka, F. Muhaffel, A. Góral, A. Wierzbicka-Miernik, P. Petrzak, M.O. Cichocka, M. Kulczyk, U. Kolb, Phase transformation of coatings produced with micro-arc oxidation on titanium through hydrothermal treatment, Materials Chemistry and Physics 343 (2025) 131001

3.

Ł. Maj, A. Jarzębska, A. Trelka, M. Bieda, M. Gieleciak, S. Boczkal, J. Skiba, M. Kulczyk Correlating multi-pass hydrostatic extrusion characteristics with microstructure and mechanical properties of titanium grade 4, Archives of Civil and Mechanical Engineering 25 (2025) 299

4.

D. Wojtas, M. Marciszko-Wiąckowska, **Ł. Maj**, Residual stresses in materials modified by plasma electrolytic oxidation: Insights and implications for performance, Progress in Surface Science 100(3) (2025) 100780

5.

M. Gieleciak, A. Jarzębska, **Ł. Maj**, P. Petrzak, M. Kulczyk, Ł. Rogal, M. Bieda, Influence of

magnesium addition on microstructural and mechanical stability of hydrostatically extruded biodegradable zinc alloys, Bioactive Materials 44 (2025) 1-14

6.

Ł. Maj, F. Muhaffel, A. Jarzębska, A. Trelka, K. Balin, M. Bieda, H. Cimenoglu, Unveiling the mechanisms of coating formation during micro-arc oxidation of titanium in Na2HPO4 electrolyte, Surface and Coatings Technology 476 (2024) 130224

7.

S. Terlicka, N. Sobczak, **Ł. Maj**, P. Darłak, J. Sobczak, Wettability, reactivity, and interface structure in Mg/Ni system, Journal of Magnesium and Alloys 12 (2024) 659-672

8.

A. Kuś, V. Rajtukova, W. Pilarczyk, R. Hudak, T. Mehner, **Ł. Maj**, T. Lampke, A. Małachowska, First attempt to print Co-based alloys with high glass forming ability by selective laser melting, Journal of Alloys and Compounds 995 (2024) 174680

9.

Ł. Maj, Z. Fogarassy, D. Wojtas, A. Jarzębska, F. Muhaffel, A. Sulyok, A. Góral, M. Kulczyk, H. Çimenoğlu, M. Bieda, In-situ formation of Ag nanoparticles in the MAO coating during the processing of cp-Ti, Scientific Reports 13 (2023) 3230

10.

Ł. Maj, F. Muhaffel, A. Jarzębska, A. Trelka, M. Kulczyk, H. Cimenoglu, M. Bieda, Microstructure characterization of titania-based micro-arc oxidation coatings with nanoparticles, Materials Proceedings 14 (2023) 14

11.

K. Trembecka-Wójciga, M. Jankowska, W. Tomal, A. Jarzębska, **Ł. Maj**, T. Czeppe, P. Petrzak, A. Chachaj-Brekiesz, J. Ortyl, Advanced 3D Printing of Graphene Oxide Nanocomposites: A New Initiator System for Improved Dispersion and Mechanical Performance, European Polymer Journal 198 (2023) 112403

12.

Ł. Maj, D. Wojtas, A. Jarzębska, M. Bieda, K. Trembecka, R. Chulist, W. Kozioł, A. Góral, A. Trelka, K. Janus, J. Kawałko, M. Kulczyk, F. Muhaffel, H. Çimenoğlu, K. Sztwiertnia, Titania coating formation on hydrostatically extruded pure titanium by micro-arc oxidation method, Journal of Materials Science and Technology 111 (2022) 224-235

13.

H. Paul, P. Petrzak, R. Chulist, **Ł. Maj**, I. Mania, M. Prażmowski, Effect of impact loading and heat treatment on microstructure and properties of multi-layered AZ31/AA1050 plates fabricated by single-shot explosive welding, Materials and Design 214 (2022) 110411

14.

D. Toboła, J. Morgiel, **Ł. Maj**, M. Pomorska, M. Wytrwal-Sarna, Effect of tribo-layer developed during turning of Ti-6Al-4V ELI alloy on its low-temperature gas nitriding, Applied Surface Science 602 (2022) 154327

15.

J. Morgiel, **Ł. Maj**, K. Szymkiewicz, M. Pomorska, P. Ozga, D. Toboła, M. Tarnowski, T. Wierzchoń, Surface roughening of Ti-6Al-7Nb alloy plasma nitrided at cathode potential, Applied Surface Science 574 (2022) 151639

Scientific projects

National Science Centre

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Optimization of micro-arc oxidation process parameters aimed at incorporation of ceramic antibacterial additions into coating produced on the surface of commercially pure titanium, SONATA, 2020/39/D/ST8/01783, 2021-2025, principal investigator

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The synergy effect of mechanical surface treatment and low-temperature nitriding on the improvement of selected properties of surface layer of Ti6Al4V alloy, SONATA, 2020/39/D/ST8/02610, 2021-2023, co-investigator

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Investigation of process of synthesis of intermetallic phases from multilayer Al/Ni, Al/Ti and Ni/Ti coatings using in-situ TEM observations, OPUS, 2012/05/B/ST8/01794, 2013-2016, co-investigator

-

Mechanism of diffusion layers formation in multilayered clads based on light metals of increased impact resistance, OPUS, 2016/21/B/ST8/00462, 2017-2020, co-investigator

-

Analysis of strengthening mechanisms of newly-developed biodegradable zinc alloy with copper subjected to combined deformation process, PRELUDIUM, 2017/25/N/ST8/02870, 2018-2020, co-investigator

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Microstructural aspects of strengthening of low-alloyed hardly deformable zinc by means of unconventional method of extrusion, OPUS, 2016/23/B/ST8/00724, 2017-2020, co-investigator

-

Advanced experimental and theoretical study on shear band formation in layered twin-matrix FCC materials, OPUS, 2016/23/B/ST8/01193, 2017-2020, co-investigator

-

Multi-scale identification of strategies for the creation of high-strength biocomposites: Sea snail shells as a biomimetic inspiration for lightweight functional materials, OPUS, 2018/29/B/ST8/02200, 2019-2021, co-investigator

-

Innovative bioabsorbable zinc-based materials for potential application as cerebrovascular stents, OPUS, 2023/51/B/ST11/02814, co-investigator

National Centre for Research and Development

-

Development of novel dental implant abutment from technically pure titanium covered with antibacterial coating, LIDER13/0175/2022, 2023-2026, principal investigator

-

Ceramic composites with graphene as cutting tools and machine parts with unique properties, GRAF-TECH/NCBR/03/05/2012, 2015-2016, co-investigator

-

Development of a biocompatible material with high mechanical properties and optimal degradation rate intended for novel bioabsorbable cardiac stents, LIDER/54/0229/L-11/19/NCBR/2020, 2021-2023, co-investigator

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Isotropic titanium for biomedical applications after severe plastic deformation processes, LIDER/54/0085/L-11/19/NCBR/2020, 2021-2023, co-investigator

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Innovative porous ceramic materials printed in DLP technology using high-performance photochemical initiators dedicated to integration with bone tissue, LIDER13/0081/2022, 2023-2026, co-investigator

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New generation material for application in bioabsorbable orthopedic implants, NOR/SGS/BioAbsMat/0096/2020-00, 2021-2024, co-investigator

Bilateral cooperation

Bilateral cooperation with Istanbul Technical University, Faculty of Chemical and Metallurgical Engineering (Istanbul, Turkey) on the topic "Surface modification of metallic materials for biomedical applications", coordinator

Foreign internships

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Technische Universität Darmstadt, Darmstadt, Germany, 2023 (3 months)

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Faculty of Chemical and Metallurgical Engineering, Istanbul Technical University, Istanbul, Turkey, 2022 (4 weeks)

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Institute for Technical Physics and Materials Science, Centre for Energy Research, Budapest, Hungary, 2021 (2 weeks)

Reviews of articles for scientific journals:

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Scripta Materialia

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Journal of Materials Sciencec

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Applied Surface Science

-

Materials Chemistry and Physics

-

Journal of Thermal Spray Technology

-

Journal of Alloys and Compounds

-

Materials Letters

-

Physica Status Solidi A

-

Bulletin of the Polish Academy of Sciences: Technical Sciences

-

Materials

-

Coatings

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Archives of Metallurgy and Materials

Membership in scientific organizations

-

Polish Society for Microscopy

-

European Microscopy Society

-

European Microbeam Analysis Society

-

COST Action CA21121, WG2: Experimental and Simulation Challenges

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Scientific Board of Institute of Metallurgy and Materials Science, PAS (2023-)

Prizes and awards

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Prize of Polish Materials Science Society for the best PhD thesis in materials science,

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Award of the Head of the Institute of Metallurgy and Materials Science, Polish Academy of Sciences for research achievements, 2017-2018

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Award of the Head of the Institute of Metallurgy and Materials Science, Polish Academy of Sciences for research achievements, 2019-2020

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2021 Henry Marion Howe Medal granted by ASM International for the article "Controlled grain refinement of biodegradable Zn-Mg alloy: Effect of magnesium alloying and multi-pass hydrostatic extrusion preceded by hot extrusion" published in Metallurgical and Materials Transactions A journal, 2021

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Bronze Cross of Merit, 2022

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KMM-VIN Research Fellowship (Call 15), 2023

Organization of conferences and scientific events

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XVIII International Conference on Electron Microscopy, 9-12.06.2024, Zakopane, Poland (member of organizational committee)

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4th International Graduate Research Symposium (IGRS'25), 12-14.05.2025, Istanbul, Turkey (member of scientific committee)

Main scientific interest

Surface engineering: fabrication of coating materials, characterization of the microstructure and functional properties of coatings deposited on metallic substrates; hexagonal materials: titanium, zinc, magnesium and their alloys, application of advanced scanning and transmission electron microscopy methods in materials research