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Employment and positions

Institute of Metallurgy and Materials Science, Polish Academy of Sciences: assistant (1972-1978), assistant professor (1979-2006), associate professor (2007-2010), professor of the Polish Academy of Sciences (2010-2014), professor with tenure since 2015.
Head of the Department of Surface Engineering and Biomaterials of the Institute of Metallurgy and Materials Science of the Polish Academy of Sciences since 2016.

Scientific Career

M.Sc.: Jagiellonian University, 1971

Ph.D.: Jagiellonian University, 1979

D.Sc.: Institute of Metallurgy and Materials Science, Polish Academy of Sciences, 2007

Professor: President of the Republic of Poland, scientific title, 2015

Scientific achievements

168 papers in refereed journals and periodicals, **90** presentations during conferences, **3** books, **3**
chapters in books.

Sum of the Times Cited: **800**, Hirsch index: **18**

The most relevant publications

1.

E. Beltowska-Lehman, A. Bigos, P. Indyka, L. Tarkowski, M. Kot, J. Morgiel, *Electrodeposition of nanocrystalline Ni-Mo coatings from citrate electrolyte solution,*
Inżynieria Materiałowa

3 (2010) 369 - 372.

2.

P. Indyka, **E. Beltowska-Lehman**, A. Bigos, J. Morgiel, M. Kot, L. Tarkowski, *Optimization of*

galvanic bath composition and operating parameters for electrodeposition of Ni-W coatings,
Inżynieria Materiałowa

3 (2010) 377 - 381.

3.

M. Kot, **E. Bełtowska-Lehman**, A. Bigos, P. Indyka, J. Morgiel, W. Rakowski, *Mechanical and tribological properties of electrodeposited Ni-Mo coatings,*
Inżynieria Materiałowa 3 (2010) 373 - 376.

4.

A. Bigos, **E. Bełtowska-Lehman**, P. Indyka, J. Morgiel, *Electrodeposition of nanocrystalline matrix Ni-Mo/Al* $_2O_3$ *composites,*
Composites 2 (2011) 157 - 162.

5.

M. Kot, **E. Bełtowska-Lehman,** A. Bigos, P. Indyka, J. Morgiel, S. Zimowski, *Właściwości powłok Ni-Mo nakładanych metodą elektrochemiczną,*
Tribologia 235 (2011) 65 - 72.

6.

B. Major, **E. Bełtowska-Lehman**, A. Góral, J. Deda, *Scenariusze i strategie rozwoju technologii materiałów zaawansowanych*
, rozdział w:
Scenariusze rozwoju technologii nowoczesnych materiałów metalicznych, ceramicznych i kompozytowych
, Wydawnictwo Naukowe Instytutu Technologii Eksploatacji - PIB, Radom, 2010, tom 2, 240 - 244.

7.

E. Beltowska-Lehman, A. Bigos, P. Indyka, *Characterization of electrodeposited nanocrystalline Ni-Mo protective coatings,* Physico chemical Mechanics of Materials 8 (2010) 324 - 329.

8.

L. Tarkowski, P. Indyka, **E. Bełtowska-Lehman**, XRD characterisation of Ni-based coatings prepared by electrodeposition, Nuclear Instruments and Methods in Physics Research Section B 284 (2011) 40 - 43.

9.

E. Bełtowska-Lehman, Europejska Platforma Technologiczna Fotowoltaiki, Fotowoltaika 3 (2011) 23 - 25.

10.

E. Bełtowska-Lehman, A. Bigos, P. Indyka, M. Kot, Electrodeposition and characterisation of nanocrystalline Ni-Mo coatings, Surface and Coatings Technology 211 (2012) 67 - 71.

11.

E. Beltowska-Lehman, P. Indyka, A. Bigos, M. Kot, L. Tarkowski, Electrodeposition of nanocrystalline Ni-W coatings strengthened by ultrafine alumina particles, Surface and Coatings Technology 211 (2012) 62 - 66.

12.

E. Beltowska-Lehman, P. Indyka, Kinetics of Ni-Mo electrodeposition from Ni-rich citrate baths, Thin Solid Films 520 (2012) 2046 - 2051.

13.

E. Beltowska-Lehman, A. Goral, P. Indyka, Electrodeposition and characterization of Ni/Al2O3 nanocomposite coatings, Archives of Metallurgy and Materials 56(4) (2011) 919 - 931.

14.

A. Bigos, **E. Beltowska-Lehman**, P. Indyka, Microstructure and mechanical properties of nanocrystalline Ni-Mo protective coatings, IOP Conference Series: Materials Science and Engineering, 32 (2012) - IOP Conf. Ser.: Mater. Sci. Eng. 32 012002 doi:10.1088/1757-899X/32/1/012002

15.

P. Indyka, **E. Beltowska-Lehman**, A. Bigos, Microstructural characterization of electrodeposited coatings of metal matrix composite with alumina nanoparticles, IOP Conference Series: Materials Science and Engineering, 32 (2012) - IOP Conf. Ser.: Mater. Sci. Eng. 32 012010 doi:10.1088/1757-899X/32/1/012010

16.

P. Indyka, **E. Beltowska-Lehman**, J. Morgiel, M. Bieda, Microstructure and deposition relations in alumina particle strengened Ni-W matrix composites, Solid State Phenomena, 186 (2012) 234-238.

17.

A. Bigos, **E. Bełtowska-Lehman**, P. Indyka, M.J. Szczerba, M. Kot, Electrodeposition and properties of nanocrystalline Ni-based alloys containing refractory metal obtained from citrate baths, Archives of Metallurgy and Materials 58(1) (2013) 247 - 253

18.

A. Bigos, **E. Bełtowska-Lehman**, P. Indyka, B. Kania, M.J. Szczerba, Ni-Mo alloys electrodeposited under direct current from citrate-ammonia plating bath, Inżynieria Materiałowa 3 (2013) 135 - 139.

19.

P. Indyka, **E. Beltowska-Lehman**, L. Tarkowski, A. Bigos, E. García-Lecina, Structure Characterization of Nanocrystalline Ni-W Alloys Obtained by Electrodeposition, Journal of Alloys and Compounds 590 (2014) 75 - 79

20.

K.P. Mroz, A. Bigos, S. Kucharski, K. Dolinski, **E. Bełtowska-Lehman**, Ni-W Electrodeposited Coatings on Low Carbon Steel Substrate: Fatigue Observations, Journal of Materials Engineering and Performance 23 (2014) 3459 - 3466.

21.

B. Kania, P. Indyka, L. Tarkowski, **E. Beltowska-Lehman**, X-ray diffraction grazing-incidence methods applied for gradient-free residual stress profile measurements in electrodeposited Ni coatings, Journal of Applied Crystallography 48 (2015) 71 - 78.

22.

E. Beltowska-Lehman, P. Indyka, A.Bigos, M.J. Szczerba, M. Kot, Ni-W/ZrO2 nanocomposites obtained by ultrasonic DC electrodeposition, Materials and Design 80 (2015) 1-11.

23.

A. Bigos, **E. Beltowska-Lehman**, M. Kot, Studies on electrochemical deposition and physicochemical properties of nanocrystalline Ni-Mo alloys, Surface & Coatings Technology 317 (2017) 103-109

24.

E. Beltowska-Lehman, P. Indyka, A. Bigos, M.J. Szczerba, M. Kot, Effect of hydrodynamic conditions of electrodeposition process on microstructure and functional properties of Ni-W/ZrO2 nanocomposites, Journal of Electroanalytical Chemistry 775 (2016) 27-36

25.

K.P. Mróz, S. Kucharski, K. Doliński, A. Bigos, G. Mikułowski, **E. Beltowska-Lehman**, P. Nolbrzak, Failure modes of coatings on steel substrate, Bulletin of the Polish Academy of Sciences, Technical Sciences 64(1) (2016) 249-256

26.

E. Beltowska-Lehman, P. Indyka, A. Bigos, M.J. Szczerba,·J. Guspiel, H. Koscielny, M. Kot, Effect of current density on properties of Ni-W nanocomposite coatings reinforced with zirconia particles, Materials Chemistry and Physics 173 (2016) 524-533

27.

A. Chojnacka, J. Kawalko, H. Koscielny, J. Guspiel, A. Drewienkiewicz, M. Bieda, W. Pachla, K. Sztwiertnia, **E. Beltowska-Lehman**, Corrosion anisotropy of titanium deformed by the hydrostatic extrusion, Applied Surface Science 426 (2017) 987-994

28.

A. Bigos, **E. Beltowska-Lehman**, E. García-Lecina, M. Bieda, M. J. Szczerba, J. Morgiel, Ultrasound assisted electrodeposition of Ni and Ni-Mo coatings from the citrate ammonia

electrolyte solution, Journal of Alloys and Compounds 726 (2017) 410-416

29.

E. Beltowska-Lehman, A. Bigos, P. Indyka, A. Chojnacka, A. Drewienkiewicz, S. Zimowski, M. Kot, M. J. Szczerba, Optimisation of the electrodeposition process of Ni-W/ZrO2 nanocomposites, Journal of Electroanalytical Chemistry 813 (2018) 39-51

Research Projects

Projects from Ministry of Science and Higher Education

-

Influence of molybdenum addition on the corrosionn-resistant properties of Ni-Cu alloys; development of the new type of electrolytic coatings (Project No. KBN 3T08C 06328) IMMS PAS, supervisor, 2005-2007.

-

Designing and production of functionally graded materials (Project No. PBZ-KBN

100/TO8-2003): Subject 1: Designing and technology elaboration of functionally graded materials for the application in fotonics and fuel cells, Task 2: Elaboration of technology of antireflection gradient coatings in silicon solar cells
, IMMS PAS, contractor,
2004-2007.

-

Development scenarios of modern technologies of metallic,ceramic and composite materials (Pr oject ForeMat
No. WKP 1/1.4.5/2/2006/23/26/604):
task: SWOT analysis and PT of coating production technologies, IMMS PAS, contractor,
2006-2008.

-

Ceramic and metal matrix composites and nano-composites for aviation and automotive industry-KomCerMet (Project No. POIG.01.03.01-14-013/08), co-ordinator: Institute of Fundamental Technological Research , Task KCM3: *Nano-composities multifunctional coatings* , contractor, 2008 - 2013.

Structural Funds

-

Ceramic and metal matrix composites and nano-composites for aviation and automotive industry-KomCerMet (Project No. POIG.01.03.01-14-013/08), co-ordinator: Institute of Fundamental Technological Research, Task KCM3: Nano-composities multifunctional coatings, 2008 - 2013, supervisor of the tasks in the IMMS PAS.

National Science Centre

Nanocrystalline composite coatings Ni-W/ZrO2 obtained by electrochemical deposition, as an

alternative to toxic chromium coatings - preparation, characterization and functional properties, NCN 2011/01/B/ST8/03974, 2011 - 2014, supervisor.

Experience gained abroad:

France – Research Center of Chemical Metallurgy CNRS in Vitry, 1977 - 1998 (12 months)

India – Central Electrochemical Research Institute in Karaikudi, 1987 (3 weeks)

Italy – „La Sapienza" University in Rome, 1989 – 1992 (1 month)

France – PHASE Laboratory CNRS in Strasbourg, 1997- 2000 (2 months)

Italy – „La Sapienza" University in Rome, 1998, visiting professor (1 month)

Prizes and awards:

1979 - Ph.D. with honour

1982 - Prize from the President of the IV Division (Technical Sciences) of the Polish Academy of Sciences

2000 - Expert-Evaluateur for FP5

2006 - Nomination of the Ministry of Education and Science as the Polish representative to the Mirror Group of the European Technology Platform for Photovoltaics

2008 - Golden Cross of Merit for all the scientific activity

2012 Gold Medal for long service

Education of scientific staff

Superviser of PhD thesis:

mgr inż. Paulina Indyka, *Optimization of the microstructure and properties of Ni-W coatings deposited electrochemically*

mgr Agnieszka Bigos, *Effect of electrodeposition parameters on the properties of metallic Ni-Mo and nanocomposite Ni-Mo/Al* $_2O_3$ *coatings*

Reviewer:

Electrochimica Acta, Surface and Coatings Technology, Journal of Applied Electrochemistry, Journal of the Electrochemical Society, Materials Chemistry and Physics Archives of Metallurgy and Materials, Ministry of Science and Higher Education and Foundation for Polish Science.

Organisation of conferences and scientific events

Member of organizing commitees: International Conference on Phase Diagram Calculation and Computational Thermochemistry CALPHAD XXXIII**,** Kraków (2004), Symposium on Texture and Microstructure Analysis of Functionally Graded Materials SOTAMA-FGM, Kraków (2004), Workshop on Progress in Microstructure Characterization by Electron Microscopy MicroCEM, Zakopane (2005),
Texture Workshop, Kraków (2006),
Symposium on Texture and Microstructure Analysis of Functionally Graded Materials SOTAMA-FGM, Kraków (2007)

Co-chairman of AMT2010 Conference (Advanced Materials and Technology), Zakopane 2010

Member of Scientific Board of II National Photovoltaic Conference, Krynica 2011

Guest Editor: Archives of Metallurgy and Materials (2006, 2008)

Membership in professional societies

Member of Scientific boards of the Institute of Metallurgy and Materials Science of the Polish Academy of Sciences

Main scientific interest

Fundamental and technological aspects of the electrodeposition of metals, alloys and composites of enhanced tribological and corrosion properties from aqueous complex plating baths. Processes of electrocrystallization. Modern methods of materials characterization. Protective coatings. Renewable energy sources. Photovoltaics.Electrodeposition and micromechanical properties of nanocomposite coatings with a metallic matrix containing the addition of refractory metal reinforced by ceramic particles