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Employment and positions

Institute of Metallurgy and Materials Science, Polish Academy of Sciences:
Assistant (1970-1976), assistant professor (1996-1989), associate professor (1989-2003); from
2003 Professor with tenure.
1999-2003 Deputy Director for Scientific Research at the Institute,
2003-2011 Director of the Institute

Scientific Carrier

M.Sc.: University of Mining and Metallurgy, 1970

Ph.D.: Institute of Metallurgy and Materials Science, Polish Academy of Sciences, 1976

D.Sc.: Institute of Metallurgy and Materials Science, Polish Academy of Sciences, 1989

Professor: President of the Republic of Poland, Scientific title, 2003

Scientific achievements

300 papers, among them: **160** papers in refereed journals and periodicals (**60** of them cited by the Institute for Scientific Information in Philadelphia),

12

0 presentations during conferences,

7

chapters in books (including ELSEVIER monograph)

The most relevant publications during last 5 years

1.

B. Major, W. Mróz, T. Wierzchoń, W. Waldhauser, J.M. Lackner, R. Ebner: Pulsed laser deposition of advanced titanium nitride thin layers, Surface and Coating Technology 180-181,(2004) 580-584.

2.

J.M. Lackner, W. Waldhauser, R. Ebner, **B. Major**, T. Schöberl: Structural, mechanical and tribological investigations of pulsed laser deposited titanium nitride coatings, Thin Solid Films 453-454,(2004) 195-202.

3.

B. Major, J.T. Bonarski, W. Waldhauser, J.M. Lackner, R. Ebner: Contribution of pulsed laser deposition conditions to texture, morphology and residual stress developed in TiN layers, Archives of Metallurgy and Materials, 49,(2004) 83-92.

4.

J.M. Lackner, W. Waldhauser, R. Ebner, **B. Major**, T. Schöberl: Pulsed laser deposition of titanium oxide coatings at room temperature - structural, mechanical and tribological properties, Surface and Coatings Technology, 180-181,(2004) 585-590.

5.

R. Major, E. Czarnowska, A. Sowińska, R. Kustosz, J.M. Lackner, M. Woźniak, T. Wierzchoń, **B. Major**: Structure and biocompatibility of TiN coatings on polyurethane produced by laser ablation, e-Polymer No 026,(2005) 1-8, electronic version.

6.

B. Major: Laser technology in generating microstructure of functionally gradient materials, Archives of Metallurgy and Materials 50,(2005) 35-46.

7.

B. Major: Laser processing for surface modification by remelting and alloying of metallic systems, Chapter 7 in "Materials Surface Processing by Directed Energy Techniques" Edited by Yves Paleau, Elsevier (2006).

8.

L. Major, J. Morgiel, **B. Major**, J.M. Lackner, W. Waldhauser, R. Ebner, L. Nistor, G. Van Tendeloo: Crystallographic aspects related to advanced tribological multilayers of Cr/CrN and Ti/TiN types produced by pulsed laser deposition (PLD), Surface and Coatings Technology 200,(2006) 6190-6195.

9.

R. Major, J. Bonarski, J. Morgiel, **B. Major**, E. Czarnowska, R. Kustosz, J.M. Lackner, W. Waldhauser: Elastic TiN coating deposited on polyurethane by pulsed laser, Surface and Coatings Technology 200,(2006) 6340-6345.

10.

J.M. Lackner, W. Waldhauser, M. Berghauser, D. Hufnagel, R. Major, L. Major, **B. Major**: Growth Morphology, Adhesion and Mechanical Properties of Room-Temperature Pulsed Laser Deposition Cr-CrN Multilayer Coating, Plasma Processes and Polymers, Wiley- VCH Verlag GmbH, Wiley InterScience 4,(2007) 51-54.

11.

Arch.Metallurgy and Materials 53(2008)253-257 (SOTAMA 2007), M.J.Szczerba, J.Żukrowski, M.S.Szczerba, **B.Major**, An investigation of Ni-Mn-Ga Single Crystals Compressed at Room Temperature

12.

Prace Szkoły Inżynierii Materiałowej pod red. Prof.J.Pacyny Krynica(2008)333-337, M.J.Szczerba, J.Przewoźnik,J.Żukrowski, Cz.Kapusta, M.S.Szczerba, **B.Major**, Wpływ wysokotemperaturowego odkształcenia plastycznego na własności magnetyczne monokryształów Ni₂MnGa

13.

XXXVI Szkoła Inż.Materiałowej Kraków-Krynica 23-26.09.2008, **B.Major** /wykład na zaproszenia/ Nauki materiałowe łączące inżynierię i medycynę

14.

Inżynieria Materiałowa,1(2008)47-49, **B.Major**, E.Bełtowska-Lehman, Projektowanie i wytwarzanie funkcjonalnych materiałów gradientowych; PBZ-KBN-100/TO8/2003

15.

J.M.Lackner, J.Morgiel, M.Kot, **B.Major**, Microstructure and its defect analysis of titanium nitride and chromium nitride multilayer tribological systems; Annual Report 2008; Polish Academy of

Sciences, Warsaw, 46-47, B.Major, Nanostructural materials for cardiovascular biomedical devices

16.

Euromat 2009 /E21, Glasgow FEMS, **R.Major**, F.Bruckert, J.M.Lackner, P.Wilczek, P.Lacki, W.Waldhauser, B.Major, Relationship between surface morphology and biological cells adhesion in hydrodynamic conditions

17.

Euromat 2009 /B16, Glasgow FEMS, L.Major, J.Morgiel, J.M.Lackner, W.Waldhauser,

18.

M.Kot and **B.Major**, Wear mechanism during ball-on-disc test of Ti/TiN composite multi-layer systems produced by hybrid PLD, Inż.Mater.5(171)(2009)356-358,

19.

R.Major, F.Bruckert, J.M.Lackner, R.Ebner, R.Kustosz, P.Lacki, **B.Major**, Nanostrukturalne powłoki na bazie tytanu do kontaktu z krwią; diagnostyka strukturalna, adhezja komórek w warunkach hydrodynamicznych Arch.of Metal.and Materials 53(2008)979-984,

20.

A.Góral, J.Deda, E.Beltowska-Lehman, **B.Major**, Analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT) and Prerequisite Tree (PT) for Selected Technologies of Coating and Layer Production

21.

PATENT PL 200599, Sposób wytwarzania ochronnych kompozytowych warstw powierzchniowych na stopach tytanu na implanty kostne, Twórcy: Tadeusz WIERZCHOŃ; **Bogusław MAJOR**; Waldemat MRÓZ; Elżbieta CZARNOWSKA; Jerzy Robert STOBIECKI

22.

Arch.Metal.,and Materials 34(2009)439-447, M.J.Szczerba, J.Przewoźnik, J.Żukrowski, Cz.Kapusta, M.S.Szczerba, **B.Major**, The influence of high temperature plastic deformation on magnetic properties of Ni₂MnGa type single crystals

23.

Vacuum 83(2009)302-307, J.M.Lackner, W.Waldhauser, M.Schwarz, L.Mahoney, L.Major, **B.Major**, Polymer pre-treatment by linear anode layer source plasma for adhesion improvement of sputtered TiN coatings

24.

Bull.Pol.Ac.Ser.Techn.(2010) in press AMT2010 - invited lecture, J.M.Lackner, W.Waldhauser, A.Alananou, Chr.Teichert, F.Schmied, L.Major, **B.Major**, Mechanisms for self-assembling topography formation in low-temperature vacuum deposition of inorganic coatings on polymer surfaces

25.

Bull.Pol.Ac.Ser.Techn.58(2010)329-336 AMT2010, J.Sarna, R.Kustos, R.Major, J.M.Lackner, **B.Major**, Polish Artificial Heart - material, technology, diagnostics

26.

Inż.Materiałowa 175(2010)614-617, AMT2010, **Bogusław Major**, Krzysztof Kubiak, Jan Bonarski, Maciej Szczerba, Łukasz Major, Anna Góral, A.Rakowska, Directionally solidified CMSX-4 Nickel Based Superalloys; Microstructure, Orientation, Residual Stress, Microanalysis

27.

Inż.Materiałowa 175(2010)280-283, AMT2010, M.J.Szczerba, **B.Major**, M.S.Szczerba, A note on the kink bands in compressed Ni₂MnGa single crystals

28.

Polish Metallurgy 2006-2010 in Time of the Worldwide Economic Crisis (2010) 455-472; Committee of Metallurgy of the Polish Academy of Sciences; Editor K.Świątkowski; Łukasz Major, Marcin Kot, Juergen M.Lackner, **Bogusław Major**, Tribological Coatings on the Basis of

Multilayer Systems

29.

Advances in Materials Science , 11(2011)5-25 R.Major, J.M.Lackner, P.Wilczek, M.Sanak, B.Jakiela, B.Stolarzewicz, M.Kowalczyk, M.Sobota, K.Maksymow, M.Spisak, 36. **B.Major**, Functional Cardio-Biomaterials

30.

e-Book "Surface Tailoring of inorganic materials for Biomedical Applications" ed.Lia Rimondini, Bentham Science Publisher (2012) 297-327 (monografia), R.Major, **B.Major**; Tailoring of Tissue-Surface Interaction in Blond Conducting Materials

31.

Nanostructural materials for implants and cardiovascular biomedical devices CARDIOBIOMAT, ed.Piotr Wilczek and Roman Major ISBN 978-83-63310-004 (2012)6 (monografia), **B.Major**; Materials science in heart disease treatment

32.

Bull.Pol.Ac.:Tech. 60(2)(2012) 337-342, R.Major, K.Maksymow, J.Marczak, J.M.Lackner, M.Kot, **B.Major**; Migration channels produced by ablation for substrate endothelialization

33.

J.Kusinski, S.Kac, A.Kopia, A.Radziszewska, M.Rozmus-Górnikowska, **B.Major**, L.Major, J.Marczak, A.Lisiecki; Laser modification of the materials surface laser - a review paper, Bull.Pol.Ac.:Tech. 60(4)(2012)711-728

34.

Łukasz Major, Juergen M.Lackner, **Bogusław Major**; Tailoring of multilayer structure to tribological conditions, Inż.Materiałowa 6(2013)741744

35.

B.Major; Nanoskalowa funkcjonalizacja powierzchni biomateriałów do kontaktu z krwią,

Laboratoria, Aparatura, Badania, 4(2013)14-24

36.

R.Major, J.M.Lackner, K.Gorka, P.Wilczek, **B.Major**; Inner surface modification of the tube-like elements for medical applications, RSC Adv.,3(2013)11283-11291

37.

A.Mzyk, R.Major, M.Kot, J.Gostek, P.Wilczek, **B.Major**, Chemical control of polyelectrolyte film properties for an effective cardiovascular implants endothelialization, Archives of Civil Engineering,14 (2014) 262-268

38.

R.Major, M.Sanak, A.Mzyk, L.Lipińska, M.Kot, P.Lacki, F.Bruckert, **B.Major**; Graphene based porous coatings with antibacterial and antithrombogenic functional - Materials and design, Archives of Civil Engineering , 14(2014)540-549

39.

R.Major, F.Bruckert, J.M.Lackner, J.Marczak, **B.Major**; Surface treatment of thin-film materials to provide self-rising dialogue of endothelial and smooth muscle cells in terms of effective inhibition of platelet activation, RSC Adv.,4(2014) 9491-9502

40.

A.Mzyk, R.Major, J.M.Lackner, F.Bruckert, **B.Major**, Cytotoxicity control of SiC nanoparticles introduced into polyelectrolyte multilayer films, RSC Advances, 4(2014)31948-31954

41.

L.Major, J.M.Lackner, M.Kot, M.Janusz, **B.Major**, Contribution of TiN/Ti/a-C:H multilayers architecture to biological and mechanical properties,Bull.Pol.Ac.:Tech. 62(3)(2014) 565-570

42.

L.Major, J.M.Lackner, **B.Major**, Bio-tribological TiN/Ti/a-C:H multilayer coatings development with a built-in mechanism of controlled wear, RSC Advances, 4(2014)21108-21114

43.

K.Trembecka-Wójciga, R.Major, J.M.Lackner, **B.Major**; Biomedical inspired surface modification, Inż.Mater. 6(2014)560-563

44.

B.Major; Preface in "Self-healing materials as biomimetic smart structures" L.Drenchev and J.J.Sobczak, ISBN 978-83-88770-98-2, Foundry Research Institute, Kraków (2014)13-16

45.

Ł.Major, J.M.Lackner, **B.Major**; Wieloskalowa analiza mechanizmu zużycia wielowarstwowych powłok na bazie tytanu i węgla, Obróbka Plastyczna/ Metal Forming, 25(1)(2014)27-38

46.

B.Major; „Człowiek o wielkiej inwencji naukowej”, Rok Jana Czochralskiego T.1. Zarys biografii i dokumentacja historyczna, Zeszyty Historyczne Politechniki Warszawskiej 15(2014)19-22

47.

L.Major, M.Janusz, M.Kot, J.M.Lackner, **B.Major**; Development and complex characterization of bio-tribological Cr/CrN + a-C:H (doped Cr) nano- multilayer protective coatings for carbon-fiber- composite materials RSC Advances, 5(2015)9405-9415

Research Projects

Research Projects from Ministry of Science and Higher Education

Solicited government project

- B. Major- Polish Artificial Heart- multiyear strategic project No: 2/0-PW/PO1-PBZ-MNiSW/2007
co-ordinator: Foundation for Cardiac Surgery Development in Zabrze, Task: Elaboration of engineering materials technology and bio-engineering for heart prosthesis, supervisor, 2008-2011.

- B. Major - Elaboration of production technology of constructional elements of hot part of airplane engines by unidirectional solidification, Project No: PBZ-MNiSW-03/I/2007;
co-ordinator: Technical University in Rzeszow
Task: Advanced texture diagnostic in micro- and nano scale and measurements of residual stress in aspect of optimization of parameters of directional crystallization of superalloys, supervisor, 2007-2011.

Individual projects

- B. Major- Identification of properties, modeling and structural verification of nano-layers applied in materials with improved bio-compatibility, Project No: N 507 136 32/396, IMIM PAS;
co-supervisor: 2007-2009.

Common research within the scientific network

- B. Major; „EKOENERGY" - New materials for restore energy, co-ordinator: Institute of Fluid-Flow Machinery PAS., Gdansk.
Task: Microstructure analysis and research of multilayer functional materials of new generation for tribological application; supervisor, 2009.

Main research achievements

- Description of inhomogeneity of deformation and recrystallization texture in fcc metals and

alloys with special attention to microstructure evaluation and stored energy

- Contribution of the third elements to the phase transformation in Al-Zn base alloys
- Laser modification of structure of aluminium, commercial carbon, constructional steels and high speed steels by laser remelting and alloying using carbides and borides
- Analysis of deposition parameters during pulsed laser deposition with attention to microstructure, nono-equilibrium phases and residual stress in mono- and multilayer coatings of Ti/TiN; Cr/CrN, BN/TiN type deposited onto metallic and non-metallic substrates
- Elaboration of method for fabrication and characterization of bio-compatible coatings on the basis of TiN and Ti(C,N) deposited onto metallic and non-metallic substrates

Methodological achievements

- Development of X-ray method of residual stress measurement and experimental verification
- Analysis of residual stress state in multi-phase materials
- Elaboration of technology of fabrication of elastic coatings on polyurethane by PLD

Experience gained abroad:

Scholarship Danish Ministry of Education, Riso National Laboratory (1983) 3 months

Scholarship DAAD, Technische Universität Stuttgart (1990) 2 months

Montanuniversität Leoben, Austria, (1994) invitation 3 weeks

Shorter visits: Czechoslovakia, Inst. of Physics (1976-1990) 1 week/year; Germany

Pädagogische Hochschule Institute of Metal Physics (1976-1990) 2 weeks/year ; Austria

Montanuniversität Leoben (1995-2001) 1 week/year; Austria, Materials Center Leoben

(2001-2004) 1 week/year; Germany, Universität Stuttgart (1999) visiting professor, 1 week.

Prizes and awards:

1973, 1981, 1988 - Prize from the President of the IV Division (Technical Sciences) of the Polish Academy of Sciences

1973- Prize in the Year of the Polish Science

1975- Prize of the Polish Academy of Science and the German Academy of Sciences

2004- Prize of the President of the Polish Academy of Sciences

2005- Prize of the Polish Ministry of Science and Informatization

2005- Bachelor Cross of Order of the Polish revival

2012- Officer Cross of Order of the Polish Revival

Education of scientific staff

Supervisor of 6 Ph.D. thesis: W.Bochnowski (2000), G.Kružel (2001), R.Kosydar (2006), M.Szczerba (2012), K.Maksymow ((2013), A.Mzyk (2015)

External reviewer of 20 Ph.D. theses,

External reviewer of 16 D.Sc. thesis,

External reviewer 10 applications for professor title,

Reviewer: Archiv of Metallurgy and Materials, Surface Coating and Technology- Elsevier, American Society of Ceramics, Annales de Chemie Science des Materiaux, Journal of Materials Processing.

Membership in professional societies

Scientific Boards:

Institute of Metallurgy and Materials Science Polish Academy of Sciences - Krakow,

Institute of Technology of Electronic Materials - Warsaw,

Foundation of Cardiac Surgery Development - Zabrze,

Institute of Non-Ferrous Metals - Gliwice.

Scientific Committee

Committee on Materials Science of the Polish Academy of Sciences - president

Commission of the Technical Science Polish Academy of Arts and Science - member

Co-editor of the Bulletin of the Polish Academy of Sciences

Section: Materials Science and Engineering

Polish Society of Materials - member

Co-editor of the Archives of Metallurgy and Materials

Main scientific interest

Functionally graded materials. Biomedical and tribological coatings. Laser processing for surface modification by remelting and alloying of metallic systems. Laser ablation and pulsed laser deposition. Materials characterization including X-ray diffraction methods.