

MAGDALENA ŁĘPICKA, PhD Eng.

PRIMARY FIELDS OF RESEARCH

The effect of PVD and CVD surface modification on the performance of metallic biomaterials – titanium alloys, austenitic stainless steels, martensitic stainless steels:

- the relationship between the mechanical properties of substrate and coating and their influence on wear resistance of surface modified metallic biomaterials;
- scratch resistance of ceramic coatings deposited on metallic biomaterials;
- the influence of phase composition on the corrosion resistance of ceramic coatings used in arthroplasty.

ACADEMIC DEGREES

Doctor of Technical Sciences discipline: Machine Construction and Maintenance , specialization: Surface Engineering title of the doctoral dissertation: "The Influence of Surface Modification of Certain Metallic Biomaterials on Their Tribological and Corrosion Characteristics" My doctoral dissertation was commended by the Faculty of Mechanical Engineering, Bialystok University of Technology, Poland.	IX 2017
Doctoral studies – Faculty of Mechanical Engineering, Bialystok University of Technology, Poland <i>Machine Construction and Maintenance</i>	X 2013 – IX 2017
Master – Faculty of Mechanical Engineering, Bialystok University of Technology, Poland <i>Biomedical Engineering</i> , specialization of <i>Modern Structures and Technologies for Medicine</i> final grade: excellent	VII 2013
Engineer – Faculty of Mechanical Engineering, Bialystok University of Technology, Poland <i>Biomedical Engineering</i> , specialization of <i>Prosthetics, Orthotics and Medical Materials</i> final grade: excellent	II 2012

PROFESSIONAL EXPERIENCE

Research Fellow Nanoelectronics Engineering Department, Nanodevices Research Group International Iberian Nanotechnology Laboratory, Portugal	II 2018 – ongoing
Assistant Professor Faculty of Mechanical Engineering, Bialystok University of Technology, Poland	X 2017 – ongoing
Research and Teaching Assistant Faculty of Mechanical Engineering, Bialystok University of Technology, Poland	X 2015 – IX 2017
Scientific Traineeship Institute of Metallurgy and Materials Science, Polish Academy of Sciences, Cracow, Poland	VIII 2014 – IX 2014
Internship MEDGAL Sp. z o. o. – manufacturer of orthopedic implants and instruments, Ksiezyno, Poland	VIII 2012 – IX 2013

PUBLICATIONS AND PARTICIPATION AT SCIENTIFIC CONFERENCES

Significant publications:

1. Łepicka M., Grądzka-Dahlke M., Pieniak D., Pasierbiewicz K., Niewczas A., *Effect of mechanical properties of substrate and coating on wear performance of TiN- or DLC-coated 316LVM stainless steel*, *Wear* (2017) Vol. 382–383, pp. 62–70
2. Łepicka M., Grądzka-Dahlke M., *Surface Modification of Ti6Al4V Titanium Alloy for Biomedical Applications and Its Effect on Tribological Performance - a Review*, *Reviews on Advanced Materials Science* (2016) Vol. 46, pp. 86–103
3. Łepicka M., Grądzka-Dahlke M., *Surface Modification of AISI 440B Stainless Steel and Its Influence on Surgical Drill Bits Performance*, *Archives of Metallurgy and Materials* (2016) Vol. 61, pp. 1417–1423

4. Łepicka M., Grądzka-Dahlke M., *The effect of anodizing conditions on the corrosion resistance of Ti6Al4V titanium alloy*, Materials Testing (2015) Vol. 59, pp. 393-397

Active participation at international scientific conferences. Significant papers:

1. Łepicka M., Grądzka-Dahlke M., Sadowska A., Romaniuk P., *Corrosion Resistance of TiN- and DLC Coated Implant Alloys*, Surface Modification Technologies: SMT 2016, Milan 2016
2. Łepicka M., Grądzka-Dahlke M., *The influence of contact friction geometry on wear performance of TiN and DLC coated Ti6Al4V alloy*, Advances in Materials & Processing Technologies: AMPT 2015, Madrid 2015
3. Łepicka M., Grądzka-Dahlke M., *Surface Modification of AISI 440B Stainless Steel and Its Influence on Surgical Drill Bits Performance*, Advances in Materials & Processing Technologies: AMPT 2015, Madrid 2015
4. Łepicka M., Grądzka-Dahlke M., *The Effect of Surface Modification on Biofunctional Properties of AISI 440B Martensitic Stainless Steel*, 27th European Conference on Biomaterials: ESB 2015, Cracow 2015
5. Łepicka M., Grądzka-Dahlke M., *The Effect of TiN and DLC Surface Modification on Wear of AISI 440B Martensitic Stainless Steel Surgical Drill Bits*, 27th European Conference on Biomaterials: ESB 2015, Cracow 2015

RESEARCH PROJECTS

Project “Effect of Surface Modification of Metallic Biomaterials on Their Performance”

II 2018 – ongoing

The project is financed by the National Science Centre, Poland (PRELUDIUM 13, grant no. UMO-2017/25/N/ST8/02270)

Project “Study of the Effect of Surface Modification on the Properties of Metallic Biomaterials”

2015 – 2016

The project was implemented in the cooperation between University of Economics and Innovation in Lublin, Bialystok University of Technology in Bialystok and MEDGAL Sp. z o.o. in Ksiezyno. I performed and interpreted results of the following tests conducted on TiN- or DLC-coated Ti6Al4V titanium alloy and 316LVM stainless steel:

- wear tests (tribometer working in ball-on-disc configuration),
- wear measurements,
- adhesion of the coating to the metallic substrate (using scratch test technique),
- hardness and Young’s modulus of substrates and coatings (by the means of nanoindentation),
- corrosion tests,
- surface roughness measurements (using contact profilometer),
- microscopic observations (SEM and SEM-EDX, confocal laser microscopy).

Project “Transfer of Technology to Industry”

2013 – 2014

The project covered Podlaskie Voivodeship and was co-financed by the European Union. The specific topic of the project performed on behalf of Medgal Sp. z o. o. was “*Modification of Performance of Surgical Instruments*”. I performed and interpreted results of corrosion and wear tests of surface modified (TiN and DLC coatings obtained by PVD or CVD techniques) surgical drill bits made of AISI 440B martensitic stainless steel.

SCHOLARSHIPS AND AWARDS OBTAINED DURING DOCTORAL STUDIES

Beneficiary of the project “Scholarships for PhD students of Podlaskie Voivodeship”

V 2014 - IV 2015

The project was co-financed by European Social Fund, Polish Government and Podlaskie Voivodeship

Bialystok University of Technology Rector’s Scholarship for Outstanding Academic and Research

2013 – 2017

Results

Bialystok University of Technology Faculty of Mechanical Engineering PhD Scholarship Increase for Outstanding Academic and Research Results

2013 – 2017

Bialystok University of Technology Faculty of Mechanical Engineering PhD Scholarship

2013 – 2015

Bialystok University of Technology Rector’s Award for the Best PhD Student in the field of *Machine Construction and Maintenance*

2015

TEACHING AND SUPERVISION**Undergraduate students' teacher:**

- *Materials Science* (laboratory classes – in Polish and English),
- *Metrology and Measurement Systems* (laboratory classes – in Polish and English),
- *Metrology and Measurement Systems* (calculation classes – in Polish and English).

Author of auxiliary educational materials for *Materials Science* (in Polish and English) and *Metrology and Measurement Systems* (in English) laboratory classes.

Supervisor of final projects of undergraduate students.

LANGUAGES

English – advanced (C1), holder of the Certificate of Advanced English, issued in July 2012 by University of Cambridge

German – intermediate (B1)