



Volume 52
Issue 1
November 2011
Pages 1-64

Published since 1978
formerly as Archives of Materials Science
or Archiwum Nauki o Materiałach (in Polish)

Archives of Materials Science and Engineering



Editor-in-Chief Prof. Leszek A. Dobrzański

International Scientific Journal published monthly
by the World Academy of Materials
and Manufacturing Engineering

<http://www.archivesmse.org>



Editor-in-Chief

Prof. Leszek A. Dobrzański – Gliwice, POLAND

Editorial Council

DEPUTIES EDITOR-IN-CHIEF

Prof. Gilmar Batalha – Sao Paulo, BRASIL
Prof. Nikolaos Gouskos – Athens, GREECE
Prof. Toshio Haga – Osaka, JAPAN
Prof. Abdel Magid Hamouda – Doha, QATAR
Prof. Mark J. Jackson – Worcester, USA
Prof. Thomas Neitzert – Auckland, NEW ZELAND
Prof. Jerzy Nowacki – Szczecin, POLAND
Prof. Ming-Jen Tan – Singapore, SINGAPORE

Associated Editors Team

PRODUCTION EDITOR

Ms Marzena Kraszewska, MA – Gliwice, POLAND

TEAM SECRETARY

Dr Małgorzata Dziekońska – Gliwice, POLAND

THEMATIC AREA EDITORS

Dr Mirosław Bonek – Gliwice, POLAND
Dr Klaudiusz Gołombek – Gliwice, POLAND
Dr Magdalena Polok-Rubiniec – Gliwice, POLAND
Dr Anna Włodarczyk-Fligier – Gliwice, POLAND
Dr Bogusław Ziębowicz – Gliwice, POLAND

STATISTICAL EDITOR

Dr Daniel Pakuła – Gliwice, POLAND

LANGUAGE EDITOR

Dr Janusz Madejski – Gliwice, POLAND

Editorial Assistance

Ms Justyna Hajduczek, MSc – Gliwice, POLAND
Mr Paweł Jarka, MSc – Gliwice, POLAND
Ms Magdalena Kałużna, MSc – Gliwice, POLAND
Ms Małgorzata Ondrula, MSc – Gliwice, POLAND

Reading Direct Editors

Mr Adam Jagiełło, MSc – Gliwice, POLAND
Mr Piotr Zarychta, MSc – Gliwice, POLAND

Editorial Key Reviewers Committee

Prof. Dorel Banabic – Cluj Napoca, ROMANIA
Prof. Tadeusz Bold – Gliwice, POLAND
Prof. Tara Chandra – Wollongong, AUSTRALIA
Prof. Antonio Cunha – Guimarães, PORTUGAL
Prof. Jan Cwajna – Katowice, POLAND
Prof. Edward D. Doyle – Swinburne, AUSTRALIA
Prof. Georgiy Drapak – Khmel'nitsky, UKRAINE
Prof. Jan Dutkiewicz – Cracow, POLAND
Prof. Hong Hocheng – Hsinchu, TAIWAN

Prof. Stuart Hampshire – Limerick, IRELAND
Prof. Adam Hernas – Katowice, POLAND
Prof. Marek Hetmańczyk – Katowice, POLAND
Prof. Werner Hufenbach – Dresden, GERMANY
Prof. David Hui – New Orleans, USA
Prof. Yong-Taek Im – Daejeon, KOREA
Prof. Leopold Jeziorski Dr hc – Częstochowa, POLAND
Prof. Jan Kazior – Cracow, POLAND
Prof. Albert Kneissl – Leoben, AUSTRIA
Prof. Ivars Knets – Riga, LATVIA
Prof. Janez Kopac Dr hc – Ljubljana, SLOVENIA
Prof. Piotr Kula – Łódź, POLAND
Prof. Krzysztof J. Kurzydłowski Dr hc – Warsaw, POLAND
Prof. Karl Kuzman – Ljubljana, SLOVENIA
Prof. Eugeniusz Łągiewka – Katowice, POLAND
Prof. Bogusław Major – Cracow, POLAND
Prof. Cemal Meran – Denizli, TURKEY
Prof. Stanisław Mitura Dr hc – Łódź, POLAND
Prof. Ryszard Nowosielski – Gliwice, POLAND
Prof. Abraham Atta Ogwu – Paisley, UK
Prof. Jerzy Pacyna – Cracow, POLAND
Prof. Peter Palcek – Zilina, SLOVAK REPUBLIC
Prof. Fusheng Pan – Chongqing, CHINA
Prof. Lucjan Pająk – Katowice, POLAND
Prof. Jan Pilarczyk – Gliwice, POLAND
Prof. Wojciech Przetakiewicz – Warsaw, POLAND
Prof. Maria Richert – Krakow, POLAND
Prof. Maria H. Robert – Campinas, BRAZIL
Prof. Mario Rosso – Turin, ITALY
Prof. Stanislav Rusz – Ostrava, CZECH REPUBLIC
Prof. Yuriy Schalapko – Khmel'nitsky, UKRAINE
Prof. Jan Sieniawski – Rzeszów, POLAND
Prof. Paul Siffert – Strassburg, FRANCE
Prof. Jorge A. Sikora – Mar del Plata, ARGENTINA
Prof. Bozo Smoljan – Rijeka, CROATIA
Prof. Jerry Sokolowski – Windsor, CANADA
Prof. Mirko Sokovic – Ljubljana, SLOVENIA
Prof. Antonio Sousa – Fredericton, CANADA
Prof. Jerzy Stobrawa – Gliwice, POLAND
Prof. Vasco Teixeira – Braga, PORTUGAL
Prof. Miklos Tisza – Miskolc, HUNGARY
Prof. Laszlo Toth – Miskolc, HUNGARY
Prof. Boris Tomov Dr hc – Rousse, BULGARIA
Prof. Jose M. Torralba Dr hc – Madrid, SPAIN
Prof. Algirdas V. Valiulis – Vilnius, LITHUANIA
Prof. Tadeusz Wierzchoń – Warsaw, POLAND
Prof. Abdalla Wifi – Cairo, EGYPT
Prof. Władysław K. Włosiński Dr hc – Warsaw, POLAND
Prof. Gwomei Wu – Taoyuan, TAIWAN
Prof. Senay Yalcin – Istanbul, TURKEY
Prof. Bekir Sam Yilbas – Dhahran, SAUDI ARABIA
Prof. Andrzej Zieliński – Gdańsk, POLAND
Prof. Paweł Zięba – Cracow, POLAND
Prof. Jozef Zrnik – Pízen, CZECH REPUBLIC
Prof. Marcel Zitnansky – Bratislava, SLOVAK REPUBLIC
Prof. Marian Żenkiewicz – Bydgoszcz, POLAND

Patronage



World Academy of Materials and Manufacturing Engineering



Association of Computational Materials Science and Surface Engineering



Polish Academy of Sciences, Committee of Materials Science, Section of Metallic Materials



Institute of Engineering Materials and Biomaterials of Silesian University of Technology, Gliwice, Poland

Financial support

In 2011 the publication of the Journal is financially supported by the Ministry of Science and Higher Education in Poland.

Abstracting services

This Journal is sent to individual receivers from ca. 50 countries of the world and is delivered to the National Libraries and Universities and also to other scientific institutions in ca. 50 countries of the world. The electronic system of Reading Direct allows to access to the electronic version of that journal on-line, in the promotional period free of charge. This Journal is included in the reference list of the Polish Ministry of Science and Higher Education (9 points). The Journal is cited by Abstracting Services such as:



The procedure of its registration in the databases of Compendex, CiteSeer, GetCited, Web of science, Engineering Village, Public Knowledge Project, Edith Cowan University's Institutional Repository, Journals Online and Inspec has begun.

Journal Registration

The Journal is registered by the 1st Civil Department of the District Court in Gliwice, Poland at number 278.

Publisher



INTERNATIONAL
OCSCO
WORLD PRESS

International OCSCO World Press
ul. S. Konarskiego 18a/366,
44-100 Gliwice, Poland

e-mail: info@archivesmse.org

Bank account: Stowarzyszenie Komputerowej Nauki o Materiałach i Inżynierii Powierzchni

Bank name: ING Bank Śląski

Bank address: ul. Zwycięstwa 28, 44-100 Gliwice, Poland

Account number/IBAN CODE: PL7610501298100002300809767

Swift code: INGBPLPW

Gliwice – Sao Paulo – Athens – Osaka – Doha – Worcester – Auckland – Szczecin – Singapore

© 2011 International OCSCO World Press.

All rights reserved.

Reading Direct

This journal is a part of Reading Direct, the free of charge alerting service which sends tables of contents by e-mail for this journal and in the promotion period also the full texts of papers. You can register to Reading Direct at

<http://www.archivesmse.org>

© The paper used for this journal meets the requirements of acid-free paper.

Printed in Poland.

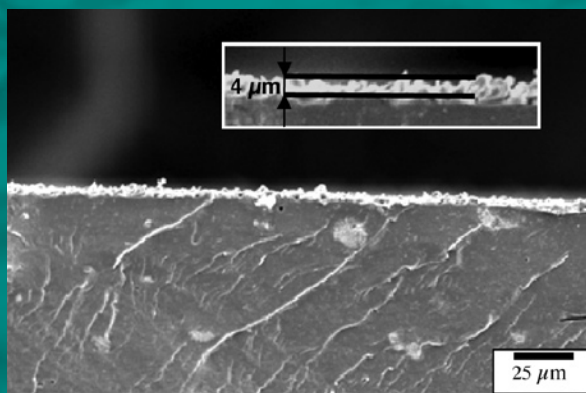
Professor

Leszek A. Dobrzanski M Dr hc
Editor-in-Chief of the AMSE
President of the WAMME
President of the ACMSSE



Dear Readers,

The scope of interests of our Archives of Materials Science and Engineering is wide. In the next issue we pay a special attention to polymers and polymer matrix composites, although we prepare for print the first issue of the next year specifically and fully dedicated to this subject. Today I recommend to pay attention to the paper on the heuristic-material science studies dealing with this topic and with the forecast of the development of this important group of engineering materials for the next decades. The inspiration for this type of researches was a European project FORSURF, coming to the end, realized at the Institute of Engineering Materials and Biomaterials of the Silesian University of Technology, Poland, dealing with the foresight of engineering materials and biomaterials surface engineering. I encourage to read this interesting monograph, also because an original scientific research methodology developed by the authors. As usual, I encourage PT Readers to read not only this, but other papers, and PT Authors to publish their scientific achievements in our pages.



The paper entitled "Development perspectives of selected technologies of polymer surface layers modification" by A.D. Dobrzańska-Danikiewicz, P. Rytlewski, K. Moraczewski and M. Stepczyńska on a page 23 informs about the results of a comparative analysis of the five selected technologies of modification of polymer surface layers based on the outcomes of own materials science and foresight research. A criterion of dividing is represented by physical processes the result of which is polymer material surface layer modification. This paper presents the results of own materials science research of surface modification for selected polymer materials subjected to the activity of corona discharges, laser light and high-temperature electron-beam irradiation. The analysed technologies include also modification with low-temperature plasma generated in the air by a generator situated outside the material modification zone and with low-temperature plasma in the conditions of low pressure (0.05-5 hPa). The value of the individual technologies as well as the type and intensity of environment influence was assessed in the course of foresight works. The results of the research are provided graphically with a bar chart, pool of context matrices, strategic development tracks and technology roadmaps. The value of this paper is represented by an original contribution consisting of objectivised assessment of the selected polymer materials surface layers modification technologies and presenting the directions of their strategic development against the overall materials surface engineering based on the results of foresight-materials science research. An important role of polymer surface layers modification technologies for the development of overall materials surface engineering was pointed out.