

Journal

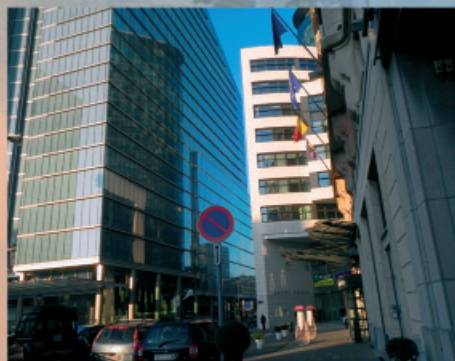
of Achievements in Materials
and Manufacturing Engineering



Published monthly as the organ of the World Academy of Materials and Manufacturing Engineering

Editor-in-Chief Prof. Leszek A. Dobrzański

Volume 49 • Issue 2 • December 2011





Journal

of Achievements in Materials
and Manufacturing Engineering

PUBLISHED SINCE 1992

**formerly as Proceedings on
Achievements in Mechanical
and Materials Engineering**

Published monthly as the organ of the World Academy of Materials and Manufacturing Engineering

Editor-in-Chief

Prof. Leszek A. Dobrzański - Gliwice, Poland

Editorial Council

Deputies Editor-in-Chief

South America

Prof. Maria Helena Robert - Campinas, Brazil

North America

Prof. George Totten - Portland, USA

Europe

Prof. Jose Manuel Torralba - Madrid, Spain

Asia

Prof. Yong Taek Im - Daejeon, South Korea

Australia

Prof. Kanaka Durga Vara Prasad Yarlagadda - Brisbane, Australia

Africa

Prof. Abdalla Wifi - Cairo, Egypt

Associated Editors Team

Production Editor

Ms Marzena Kraszewska, MA

Team Secretary

Dr Małgorzata Dziekońska

Thematic Area Editors

Dr Mirosław Bonek

Dr Klaudiusz Gołombek

Dr Magdalena Polok-Rubiniec

Dr Anna Włodarczyk-Fligier

Dr Bogusław Ziębowicz

Statistical Editor

Dr Daniel Pakuła

Language Editor

Dr Janusz Madejski

Editorial Assistance

Ms Justyna Hajduczek, MSc

Mr Paweł Jarka, MSc

Ms Magdalena Kałużna, MSc

Ms Małgorzata Ondrula, MSc

Reading Direct

Mr Adam Jagiełło, MSc

Mr Piotr Zarychta, MSc

Editorial Key Reviewers Committee

Prof. Sadek Absi Alfaro - Brasilia, Brazil

Prof. Gilmar Batalha - Sao Paulo, Brazil

Prof. Emin Bayraktar - St-Ouen, France

Prof. Andrzej Buchacz - Gliwice, Poland

Prof. Tara Chandra - Wollongong, Australia

Prof. Antonio Cuhna - Guimaraes, Portugal

Prof. Marek Dollar - Oxford, Ohio, USA

Prof. Georgiy Drapak - Khmielnitskiy, Ukraine

Prof. Sabahudin Ekinović - Zenica, Bosnia and Herzegovina

Prof. Renato Esposito - Naples, Italy

Prof. Spilios Fassois - Patras, Greece

Prof. Janez Grum - Ljubljana, Slovenia

Prof. Toshio Haga - Osaka, Japan

Prof. Marek Hetmańczyk - Katowice, Poland

Prof. Abdel Magid Hamouda - Doha, Qatar

Prof. Stuart Hampshire - Limerick, Ireland

Prof. Hong Hocheng - Hsinchu, Taiwan

Prof. Werner Hufenbach - Dresden, Germany

Prof. Mark James Jackson - Worcester, USA

Prof. Jerzy Jędrzejewski - Wrocław, Poland

Prof. Prof. Rudolf Kawalla - Freiberg, Germany

Prof. Andrzej Klimpel - Gliwice, Poland

Prof. Ivars Knets - Riga, Latvia

Prof. Janez Kopac - Ljubljana, Slovenia

Prof. Piotr Kula - Lodz, Poland

Prof. Karl Kuzman - Ljubljana, Slovenia

Prof. Bogusław Major, Cracow, Poland

Prof. Cemal Meran - Denizli, Turkey

Prof. Stanisław Mitura - Łódź, Poland

Prof. Andrew Nee - Singapore, Singapore

Prof. Jerzy Nowacki - Szczecin, Poland

Prof. Abraham Ogwu - Paisley, United Kingdom

Prof. Jerzy Pacyna - Krakow, Poland

Prof. Peter Palcek - Zilina, Slovak Republic

Prof. Fusheng Pan - Chongqing, China

Prof. Zbigniew Rdzawski - Gliwice, Poland

Prof. Mario Rosso - Turin, Italy

Prof. Stanislav Ruz - Ostrava, Czech Republic

Prof. Mirko Sokovic - Ljubljana, Slovenia

Prof. Božo Smoljan - Rijeka, Croatia

Prof. Jerry Sokolowski - Windsor, Ontario, Canada

Prof. Zinovij Stotsko - Lviv, Ukraine

Prof. Yuriy Shalapko - Khmielnitskiy, Ukraine

Prof. Jerzy Świder - Gliwice, Poland

Prof. Ming-Jen Tan - Singapore, Singapore

Prof. Miklos Tisza - Miskolc, Hungary

Prof. Boris Tomov - Rousse, Bulgaria

Prof. Bekir Sam Yilbas - Dhahran, Saudi Arabia

Prof. Gabriel Wróbel - Gliwice, Poland

Prof. Marian Żenkiewicz - Bydgoszcz, Poland



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.journalamme.org>

Patronage



World Academy of Materials
and Manufacturing Engineering



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



International Federation of Heat Treatment and Surface
Engineering



Association of Computational Materials Science and
Surface Engineering



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 online, 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:



Directory of Open
Access Journals



Google Scholar



Scirus



Ulrich's
Periodical Directory



BazTech



Journalseeker



Libsearch



WorldCat



Dragon
Libraries
Catalogue

The procedure of its registration in the databases of Scopus, Compandex, 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 Civil Department of the District Court in Gliwice, Poland at number 279.

Publisher

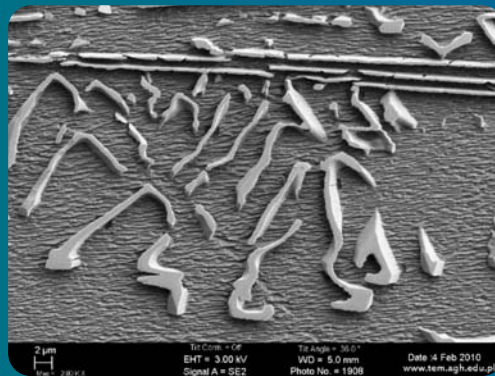


Gliwice 44-100, Poland
ul. S. Konarskiego 18a/366
e-mail: info@journalamme.org

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: PL76105012981000002300809767
Swift code: INGBPLPW

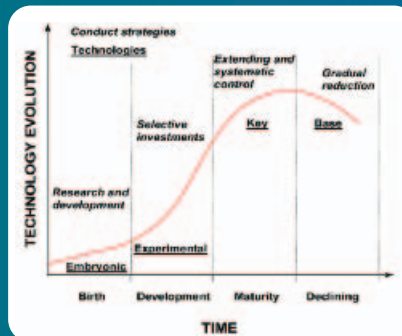
Gliwice – Campinas – Portland – Madrid – Daejeon – Brisbane – Cairo
© 2011 International OCSCO World Press. All rights reserved
The paper used for this Journal meets the requirements of acid-free paper
Printed in Poland

Selected materialographical photo



142

The research paper entitled "Microstructure characterization of Ni-Ta-Al alloy with high carbon content" by P. Bala on a **page 142** demonstrates Ni-Ta-Al alloys with high carbon content, strengthened by intermetallic phases, designed for application in high temperatures. The proposed chemical composition and the results of microstructure investigations as well as hardness in as-cast and after heat treatment condition – are given. A test melt of a mass of approximately 1 kg was made in a vacuum furnace, and cast into ceramic mould. The microstructure of the investigated material was examined by a light microscope Axiovert 200 MAT and the scanning electron microscope FIB Zeiss NEON 40EsB CrossBeam. The heat treatment was performed using the DT 1000 dilatometer made by Adamel Lhomargy, the French Company. The new chemical compositions and microstructure of high temperature application Ni based materials with high carbon content. Additionally, the new alloy, except high carbon volume fraction, is strengthened by intermetallic phases. The main constituents of the microstructure of the Ni-Ta-Al investigated alloy are: the γ_0 phase (matrix), the γ' phase (fine globular precipitates) and as well as primary Ta carbides of MC type and graphite. Primary carbides of irregular shapes are uniformly distributed and not forming agglomerates. The new model alloy which allows to design a new material for high temperatures applications.



121

The research monograph entitled "The state of the art analysis and methodological assumptions of evaluation and development prediction for materials surface technologies" by A.D. Dobrzańska-Danikiewicz on a **page 121** demonstrates an analysis of the state of the art including the general development trends and most prospective areas of

materials surface engineering and to describe the general methodological concept for the evaluation and prediction of materials surface technology development, with special consideration given to methods for generating a pool of critical materials surface technologies. One of the final effects of the technology foresight of materials surface engineering is to establish the Critical Technologies Book comprising technology roadmaps and technology information sheets. The Book characterises, in a harmonised fashion, the critical materials surface technologies, which is a convenient tool of comparative analysis, especially for SMEs lacking the funds sufficient to pursue their own research in this field. The paper presents the general development trends and most prospective areas of materials surface engineering and an original, newly established customs, methodological concept for the evaluation and prediction of materials surface engineering development.