

GDAŃSK UNIVERSITY OF TECHNOLOGY



**11/12 G. Narutowicza Str.
80-952 Gdańsk**

Chemical Faculty

**DEPARTMENT OF ELECTROCHEMISTRY,
CORROSION & MATERIALS ENGINEERING**

www.korozja.pl

REPORT 2004-2007

Gdańsk 2008

GDAŃSK



Gdańsk is the Polish maritime capital with a population nearing half a million. It is a large centre of economic life, science, culture, and a popular tourist destination. Lying on the Bay of Gdańsk and the southern coast of the Baltic Sea the city is a thousand years old. With its Hanseatic tradition, it has, for ages, played a major role in the commercial relationships between Northern and Western Europe on the one hand, and the countries of Central and Eastern Europe on the other hand. Today, Gdańsk is the capital of the Pomeranian province and is an important administration centre.

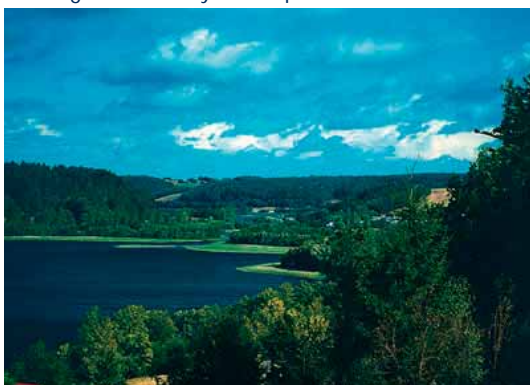


In its "golden age" the city enjoyed the specific status of a municipal republic. It was also a melting pot of cultures and ethnic groups. The air of tolerance and the wealth built on trade made culture, science, and art flourish. Today, works by outstanding Gdańsk masters can be admired in museums, churches, and galleries. These collections, as well as historic sites of enchanting beauty witness a thousand years of the city's continued existence.

The recent ten years or so have brought a huge transformation to the economy of Gdańsk. The city's industrial map continues to include some of the traditional branches, e.g. the shipping, petrochemical, chemical, and food industries. However, the share of know-how-based lines such as: electronics; telecommunications; IT technology; cosmetics and pharmaceuticals are on the rise. The specific trade of amber processing is also far from

minor in importance. Gdańsk cultivates its centuries-long tradition in the field, and its nickname of the world capital of amber is well earned. Just like in the olden days the city owes much to its sea port. The harbour, the largest along the Polish coast and on the entire Southern Baltic basin, continues to develop.

Gdańsk is strategically located at the crossing of major transit routes and plays the function of a large transport and cargo-handling centre. It offers a well-developed business infrastructure, rich research, technical and advisory backup and highly-educated human resources. All these factors put Gdańsk among the top-ranking Polish cities in terms of investment attractiveness. The city owns extensive land available for investments and sites designated for development, including buildings of historic status. The envisaged future of Gdańsk is directed to such ventures as, for instance, the bold project of creating a multi-functional downtown area to span 3 Maja Street and bind a separated city into a single organism, reconstructing the 17th century Elizabethan theatre and revitalising the 19th century Lower City residential district. Ultimately, the city cherishes a vision of a huge investment undertaking: the project of erecting the New City on the post-industrial estate reclaimed from the Gdańsk Shipyard.



Gdańsk has a modern international airport and two ferry terminals servicing regular lines between Gdańsk and Copenhagen via Trelleborg (Denmark), and Gdańsk and Nynashamn (Sweden).

Our living standard is determined by the quality of the surrounding natural environment. In Gdańsk the issue of environmental protection is given an exceptionally high priority, as is evidenced by its numerous environmental investments. Nature has been very generous here. Sprawling on the southern Baltic coast, Gdańsk has gained a lot thanks to its background of the picturesque Tri-City Landscape Park and the hills and lakes of the Swiss-like Kashubian district.

The attractions on offer to those who seek leisure by the sea comprises twenty-three kilometres of clean beaches, three

organised bathing-areas, and a 130-metre long pier. These are complimented by such other outdoor attractions as the Gdańsk cycling tracks, zoological gardens, the famous Oliwa Park with its ancient trees, the "Gdańsk Fortress" Culture Park of City Fortifications with unique authentic military architecture, numerous parks and city squares and the nature reserves of the Sobieszewo Island. The list is far from complete. The heart of the Old City features a yacht marina. Amateurs of water sports can indulge in their pastime out in the Bay of Gdańsk or along the Motława Arm, an exquisite watercourse for canoeing activities.

GDAŃSK UNIVERSITY OF TECHNOLOGY



Gdansk University of Technology (GUT) is the oldest and the largest scientific and technological academic institution in the Pomeranian region, employing 2,500 staff including 1200 academics. The number of students approximates 20,000, most of them studying full-time. Their career choices vary from architecture to business and management, from mathematics and computer science to biotechnology and environmental engineering, from applied chemistry to geodesy and transport, from ocean engineering to mechanical engineering and ship technology, from civil engineering to telecommunication, electrical and control engineering; but their life goals are common: to meet the challenge of the changing world.

There are 10 faculties covering almost all fields of science and technology. All of them are situated in the campus. Gdansk University of Technology provides broad-based education and research within engineering science, natural science and architecture. Education and co-operation with industry are an increasingly important part of our existence and have now become a life-long process.

GUT's aim is to play a key role throughout the whole of this chain. At our University we focus principally on the Eng., MSc Eng., M. Arch and Ph.D. programmes. Our role in this life-long learning process will increase in the

future. All teaching at Gdansk University of Technology is based on a solid, scientific foundation and a great deal of the research conducted at our University is well to the fore in the international arena.

Our faculties cover a much wider range of education than other Polish technical universities do, and the scientific research comprises the areas which include the domains of technology of the 21st century. This refers to all the faculties constituting the basic core of the school but is also appropriate for numerous non-faculty units. The most remarkable example of adapting the University to the challenges of the 21st century is embodied by the unique scientific and research equipment, exemplified by NMR 500 MHz apparatus, powerful supercomputers ranked as belonging to an exclusive group of a few hundred fastest mathematical machines in the world (see list TOP 500!), which



can be found in the Academic Computer Centre TASK. This equipment, combined with the very high and noteworthy qualifications of our computer scientists makes our school one of the best schools in Poland and one of better recognised schools in Europe, educating unique specialists in programming technology and computer methods of solving the most complicated scientific, engineering, organisational and economic problems.

Apart from education and research, Gdansk University of Technology has a very old tradition and rich, yet classic, student life, with student union activities and cultural and sport events of a wide and varied nature.

CHEMICAL FACULTY OF GDAŃSK UNIVERSITY OF TECHNOLOGY

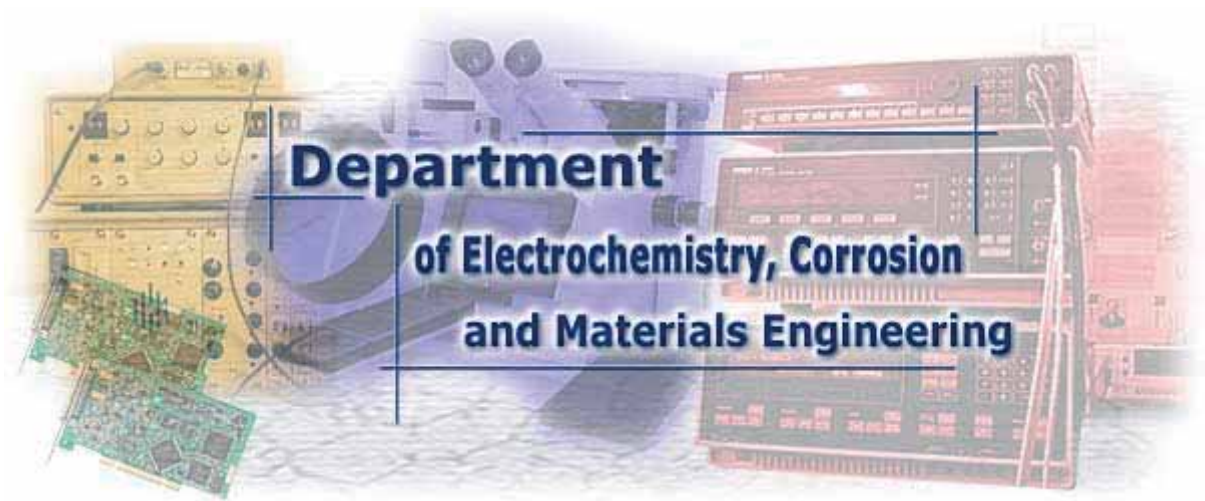
Staff: Professors – 43, academic teachers with Ph.D. degrees – 54, other academic teachers 24, total staff - 236



The Chemical Faculty is divided into 15 departments. The faculty's main research topics include: physical chemistry - applied electrochemistry, solution structure and thermodynamics; inorganic chemistry, chemistry and stereochemistry of organosilicon compounds, solid state chemistry; organic chemistry - new synthetic methods, mechanisms of reactions, supramolecular chemistry, stereochemistry; biotechnology - rational design of chemotherapeutic agents, production and application of recombinant proteins; chemical engineering mass transfer in bubble column reactors, heat transfer; environmental and analytical chemistry - analytical methods of detection and determination of pollutants, separation methods in environment protection; chemical technology - chemistry and technology of elastomers and biocompatible polymers; chemistry and technology of (lipids and detergents; food chemistry and technology - seafood proteins, food preservation, analysis and quality assessment; corrosion science - mechanism and kinetics of corrosion processes, electrochemical anticorrosion protection technologies, electrochemical investigation techniques, passivity and passivation, surface treatment, analysis of non-stationary electrochemical processes, joint time-frequency methods and higher order spectral analyses of electrode processes.

Several scientific and technological achievements of the Chemical Faculty's staff members are worth mentioning. Scientists working at the Chemical Faculty before World War II made a substantial contribution to chemical sciences. One of them is Professor Adolph Butenandt who, in 1939, was awarded the Nobel Prize for his achievements in research on the chemistry of steroids. This high level of scientific research has been sustained in the post-war years. Selected achievements of this period include: the discovery and development of novel chemotherapeutic agents, including edeine, tetaïne, amphotericin B derivatives of low toxicity, acridine derivatives (Ledacrin, C-1311); substantial contributions to peptide chemistry ("Gdańsk peptide school"); disclosing of several factors affecting the functional properties of proteins in heated and in frozen stored muscle foods; development of technology of novel silicon adhesives (SIKOP); elaboration of a new type of analytic device for determination of organic chlorine compounds in industrial petroleum refinery systems; development of a new method of corrosion protection of huge steel containers and pipelines, (for which the faculty was awarded a Bronze Medal at the World Exhibition of Invention, Research and Industrial Innovation EUREKA'1995, Brussels); development of new catalysts for industrial hydrogenation of fats; new technology of processing microcellular polyurethane elastomers applicable in the leather industry. The courses offered in the Chemical Faculty lead to engineer (equivalent to BSc) or magister (equivalent to MSc) titles in: Biotechnology, Chemical Technology, Environmental Protection and Materials Engineering. Postgraduate studies leading to a PhD diploma are offered to Polish as well as non-Polish residents holding a magister title (or equivalent) in chemistry, chemical technology, materials engineering or biotechnology. In 2002 there were 130 PhD students.





CONTENTS

1. THE HISTORY OF THE DEPARTMENT	8
2. STAFF	8
3. TEACHING	8
3.1. Corrosion Engineering speciality	8
3.2. Anticorrosion Protection Technology speciality	10
3.3. Postgraduate studies - Anticorrosion Protection Technology	11
3.4. PhD studies	12
4. RESEARCH ACTIVITIES	13
4.1. Publications in the ISI Web Knowledge since 2004	13
4.2. Another, reviewed publications since 2004	17
5. TECHNOLOGICAL ACTIVITIES	19
5.1. Co-operating firms	19
5.2. Implementations, industrial projects and expertises realized since 2004	22
6. PROPOSAL	28
7. CAMPUS MAP	29

1. THE HISTORY OF THE DEPARTMENT

The Marine Corrosion Chair existing within The Department of Physical Chemistry was created in 1956. The chair of Anticorrosion Technology was formed in 1968/69 within the institute for Chemical Engineering and Measurement Techniques, after structural changes from the Department into Institutes. The Chairs were located in Chemistry Building A. after financing new construction the Chair moved to new laboratories and workshops in the Chemistry Building C, 3rd floor in 1989/90.

The Department of Anticorrosion Protection Technologies was created in 1991 after the Chemical Faculty returned to the Department structure.

Because of the Departmental development and new scientific interests, on 1st of September 2003 the name was changed to: the Department of Electrochemistry, Corrosion and Materials Engineering.

2. STAFF

The staff of the Department consists of one full professor, eight senior lecturers (with Ph.D. academic titles), two specialists, two senior technicians, and four PhD students. Table 1 gives names, telephone numbers and e-mail addresses of the department's staff.

Tab. 1. Department's staff

Position	Academic Title	Name	Tel. +4858	E-mail
Head of Department	Titular Professor	Kazimierz Darowicki	347-24-83	zak@chem.pg.gda.pl
Full professor	DSc			
Senior lecturer	Dr	Anna Arutunow	347-22-83	anka@chem.pg.gda.pl
Senior lecturer	Dr	Stefan Krakowiak	347-12-17	stefank@chem.pg.gda.pl
Senior lecturer	Dr	Juliusz Orlikowski	347-22-83	juliuszo@pg.gda.pl
Senior lecturer	Dr	Paweł Ślepski	347-14-40	pawelkor@chem.pg.gda.pl
Senior lecturer	Dr	Andrzej Miszczyk	347-19-15	misa@chem.pg.gda.pl
Senior lecturer	Dr	Michał Szociński	347-19-15	micszoci@chem.pg.gda.pl
Senior lecturer	Dr	Artur Zieliński	347-14-40	ziela@chem.pg.gda.pl
Senior lecturer	Dr	Krzysztof Żakowski	347-16-97	zaczek@chem.pg.gda.pl
PhD student	MSc	Jacek Ryl	347-21-66	jacekr@chem.pg.gda.pl
PhD student	MSc	Karolina Andrearczyk	347-21-66	corolla@chem.pg.gda.pl
PhD student	MSc	Adam Andrearczyk	347-14-40	andre@chem.pg.gda.pl
PhD student	MSc	Marcin Jaworski	347-12-17	yawa@chem.pg.gda.pl
Specialist	MSc	Elżbieta Stankiewicz	347-10-92	ela@chem.pg.gda.pl
Specialist	Ing	Bronisław Kempa	347-29-06	kempa@chem.pg.gda.pl
Senior technician	Tech	Andrzej Dul	347-29-06	dul@chem.pg.gda.pl
Senior technician	Tech	Tadeusz Sonneck	347-28-51	sonneck@chem.pg.gda.pl

3. TEACHING

The Department of Electrochemistry, Corrosion and Materials Engineering is the only didactic unit in Poland, which realises didactic programmes and research in the field of corrosion science and anticorrosion protection. Nowadays, the department specializes in two areas: Corrosion Engineering and Anticorrosion Protection Technologies. Corrosion Engineering is a speciality involved with Materials Engineering studies, whereas Anticorrosion Protection Technologies is a part of Chemical Technology studies. Offered didactic programmes were discussed and appraised by the Working Party "EDUCATION" EUROPEAN FEDERATION OF CORROSION (EFC) and got very good notices. Besides MSc. Studies, Anticorrosion Protection postgraduate studies and professional courses are also organised in the department.

3.1. Corrosion Engineering speciality

Material degradation is a very common phenomenon; hence the knowledge of corrosion processes and methods of its prevention and protection is one of the most important features of Materials Engineering. On the basis of the department's apparatus, laboratory, and teaching experience the Corrosion Engineering speciality has been formed within the Materials Engineering interfaculty studies.

The didactic aim of this specialty is preparation to professional work in the field of anticorrosion protection. Creation of this specialty was based on accepted and new syllabus, which was developed in the Corrosion Protection Centre of University of Manchester Institute of Science and Technology (UMIST). Materials Engineering syllabus is very wide and consists of studies of mechanisms and types of corrosion processes; synthesis, research and uses of organic coatings and linings in anticorrosion protection; application of electrochemical protection techniques; passivity studies and stainless steel, nickel, aluminum and titanium utilization; inhibitors activity and their use in water and refinery systems; characteristics of corrosion processes at high temperatures; impact of the biological agents on the corrosion processes run; thin layer formation on metal surfaces by means of plasma methods, chemical and physical deposition; application of non-destructive techniques in failure diagnostics and corrosion monitoring. One of the major elements of the department's syllabus is coating systems designed for corrosion protection; design of the inhibitor protection, cathodic and anodic protection installations. In many practical cases it is necessary to employ various materials and protection methods; hence students discuss corrosion protection systems, their design fundamentals and detailed function. An important issue is normalisation and management in corrosion science and anticorrosion protection.

Tab. 2A. Corrosion Engineering specialty subjects, first level of study (7 semesters)

Subjects	
1	Mathematics
2	Physics
3	Chemistry
4	Electrochemistry
5	Informatics
6	Digital Measurements
7	Electrotechniques and Electronics
8	Technical Mechanics and Cracking
9	Thermodynamics
10	Engineering Graphics
11	Solid State Physics
12	Crystallography
13	Background of Materials Engineering
14	Materials and Technical Development
15	Metals and Alloys
16	Polymer Engineering
17	Functional Materials
18	Computer Modelling of Materials
19	Physical Measurement Techniques
20	Mechanical Measurement Techniques
21	Strength of Materials
22	Electron and Optical Microscopy
23	Corrosion Measurements
24	Material Technologies I,II,III
25	Material Degradation Mechanisms
26	Polymer Production and Processing
27	Nanotechnology
28	Physical Education
29	Foreign language
30	Environmental Protection
31	Economics
32	Corrosion Processes
33	Corrosion Structural Metallurgy
34	Anticorrosion Technologies
35	Standardization and Corrosion Management
36	Biocorrosion
37	Monitoring and Corrosion Diagnostics
38	Corrosion English Terminology
39	Engineering Diploma Project
40	Engineering Exam

Tab. 2B. Corrosion Engineering specialty subjects, second level of study (3 semesters)

Subjects	
1	Physics
2	Digital Measurements
3	Computer Design of Materials
4	Material Physics
5	Metals and Alloys
6	Polymer Engineering
7	Functional Materials
8	Physical Measurement Techniques
9	Mechanical Measurement Techniques
10	Computer Modelling
11	Intellectual Property Rights
12	Management and Enterprise Economic
13	Organization and Management
14	Electrochemical Measurement Techniques
15	High Temperature Corrosion
16	Galvanotechnique
17	Analysis of Corrosion Damages
18	Corrosion of Polymers
19	Economic Surroundings
20	Anticorrosion Systems Design
21	Master of Science Diploma
22	Master of Science Exam

*A detailed description of particular subjects including the topics discussed, the number of classes per semester and schedule of laboratory exercises can be found on the web side of the department <http://www.korozja.pl>

3.2. Anticorrosion Protection Technology speciality

As opposed to Corrosion Engineering studies, Anticorrosion Protection Technology studies are realised as a part of Chemical Technology studies. So, this didactic proposition is aimed at students who have a very good chemical background and its main purpose is the preparation of engineers for anticorrosion protection on the basis of chemical engineering knowledge, solid state chemistry, organic chemistry and physical chemistry.

Tab. 3A. Anticorrosion Protection Technology speciality subjects, first level of study (7 semesters)

Subjects	
1	Mathematics
2	Physics
3	Inorganic Chemistry
4	Organic Chemistry
5	Physical Chemistry
6	Analytical Chemistry
7	Instrumental Analysis
8	Electrotechniques and Electronics
9	Laboratory Techniques
10	Chemical Technology and Sustainable Development
11	Background of Chemical Technology
12	Energetic and Chemical Raw Products
13	Inorganic Technology
14	Organic Technology
15	Separation Techniques
16	Chemical and Technical Thermodynamics
17	Engineering Graphics
18	Theory of Machines

19	Chemical Engineering
20	Chemical Industry Apparatus
21	Automatics and Measurements
22	Quality and Production Management
23	Environmental Protection in Chemical Technology
24	Construction Materials and Corrosion
25	Chemical Processes Design
26	Firm Management and Economics
27	Membrane Technologies
28	Technical Safety
29	Introduction to Polymer Technology
30	Philosophy
31	Physical Education
32	Foreign Language
33	English Corrosion Terminology
34	Intellectual Property Rights
35	Informatics Technologies
36	Corrosion Metal Science
37	Anticorrosion Technologies I
38	Corrosion Monitoring
39	Introduction to Corrosion Science
40	Corrosion Measurements
41	Engineering Project
42	Engineering Exam

Tab. 3B. Anticorrosion Protection Technology speciality subjects, second level of study (3 semesters)

Subjects	
1	Chemical Reactors Engineering
2	Catalysis and Surface Phenomena
3	Technological Processes Modelling
4	Background of Biotechnology
5	Ergonomics and Technological Safety
6.1	Inorganic Chemistry II
6.2	Organic Chemistry II
6.3	Physical Chemistry II
6.4	Analytical Chemistry II
7	Structural Analysis Methods
8	Nanotechnology
9	Anticorrosion Technologies II
10	Corrosion Industry
14	High Temperature Corrosion
15	Non-destructive Testing
16	Failure Analysis
17	Bio-corrosion
18	Diploma Seminar
19	Diploma
20	Master of Science Exam

* A detailed description of particular subjects including the topics discussed, the number of classes per semester and schedule of laboratory exercises can be found on the web side of the department <http://www.korozja.pl>

3.3. Postgraduate studies – Anticorrosion Protection Technology

The main aim of this study is the introduction to theoretical backgrounds, practical aspects and new trends in anticorrosion protection, with special interest in organic coatings. The syllabus is composed of 250 didactic hours in 2- semesters (meetings twice a month). Postgraduate studies include subjects presented in tab. 4.

Tab. 4. Postgraduate Anticorrosion Protection Technology speciality subjects

General subjects	
1	Corrosion Background
2	Corrosion Metallography
3	Corrosion Engineering
4	Corrosion Diagnostics
5	Organic Coatings Protection
6	Electrochemical Protection
7	Ecological Issues
8	Diploma Exam

Participants of the postgraduate studies receive certificates licensed by Gdańsk University of Technology.

3.4. PhD studies

The Chemical Faculty also gives the possibility of four-year PhD studies which are comprised of Electrochemistry and Corrosion. PhD studies recruitment is based on the MSc certificate competition. PhD studies participants are obliged to attend their lectures, deliver a fixed number of teaching classes and pass exams on the subjects proposed by the Faculty Council. The final PhD exam is preceded by opening of PhD trial and examinations on a speciality subject, a modern language and an additional, non-speciality discipline.

Tab. 5. List of students who obtained PhD title since 2004

N ^o	Name	Title of PhD dissertation	Supervisor	Date
1	Dr A. Krakowiak	Harmonic analysis of non-stationary electrochemical processes	Prof. K. Darowicki	04 February 2004
2	Dr P. Ślepski	Measurements of instantaneous impedance by means of package of sinusoidal perturbation	Prof. K. Darowicki	25 March 2005
3	Dr W. Felisiak	Analysis of chemical oscillation reactions in joint time-frequency domain	Prof. K. Darowicki	17 May 2006
4	Dr M. Szociński	Cyclic mechanical stress impact on durability of organic coating systems	Prof. K. Darowicki	13 December 2006
5	Dr A. Arutunow	Application of electrochemical impedance spectroscopy to passive layer cracking investigation on stainless steel AISI 304L	Prof. K. Darowicki	13 December 2006
6	Dr J. Kawula	Investigation of conducting polymer properties by means of electrochemical impedance spectroscopy	Prof. K. Darowicki	04 April 2007
7	Dr A. Mirakowski	Acoustic emission, noninvasive technique of corrosion processes investigation	Prof. K. Darowicki	04 April 2007

4. RESEARCH ACTIVITIES

Research and didactic activities are closely interrelated. Conducted investigations modify and improve the didactic process. On the other hand the scientists document their scientific progress by performing the research and publishing its results. Such an approach makes continuous progress in scientific research a priority of the Department.

4.1. Publications in the ISI Web Knowledge since 2004

Measurable effects of scientific activities are the papers which are published in the periodicals included the designated Philadelphia List. These periodicals merit in publications possessing the character of innovation and acceptance of the paper is preceded by very rigorous and conscientious refereeing process. The staff of the Department belongs to the group of the most active employees of the Faculty of Chemistry and boasts significant productions listed below.

Darowicki K, Szociński M.; Local impedance spectroscopy of membranes, *JOURNAL OF MEMBRANE SCIENCE*, Volume: 303 Issue: 1-2 Pages: 1-5 Published: OCT 15 2007

Darowicki K, Kawula J.; Dynamic electrochemical impedance spectroscopy of the adsorption and relaxation of polyaniline chains during potentiodynamic redox transformations, *RUSSIAN JOURNAL OF ELECTROCHEMISTRY*, Volume: 43 Issue: 9 Pages: 1055-1063 Published: SEP 2007



Czaja M, Makowski M, Szociński M, Darowicki K, Chmurzyński L.; Molecular heteroconjugation equilibria in (n-butylamine plus acetic acid) systems in binary (Dimethyl sulfoxide+1,4-dioxane) solvent mixtures, *INTERNATIONAL JOURNAL OF THERMOPHYSICS*, Volume: 28 Issue: 3 Pages: 865-875 Published: JUN 2007



Smulko JM, Darowicki K, Zielinski A.; On electrochemical noise analysis for monitoring of uniform corrosion rate, *IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT*, Volume: 56 Issue: 5 Pages: 2018-2023 Published: OCT 2007

Darowicki K, Orlikowski J, Zielinski A, Jurczak W.; Quadratic Cohen representations in spectral analysis of serration process in Al-Mg alloys, *COMPUTATIONAL MATERIALS SCIENCE*, Volume: 39 Issue: 4 Pages: 880-886 Published: JUN 2007

Darowicki K, Orlikowski J.; Impedance analysis of Portevin-Le Chatelier effect on aluminium alloy, *ELECTROCHIMICA ACTA* Volume: 52 Issue: 12 Pages: 4043-4052 Published: MAR 10 2007

Darowicki K, Zielinski A.; Analysis of electrochemical noise by means of bispectral technique, *JOURNAL OF SOLID STATE ELECTROCHEMISTRY*, Volume: 11 Issue: 1 Pages: 109-116 Published: NOV 2006

Miszczuk A, Szociński M, Darowicki K.; Interlayer defect evolution in an organic coating system on steel under hydromechanical loading, *JOURNAL OF APPLIED ELECTROCHEMISTRY* Volume: 37 Issue: 3 Pages: 353-358 Published: MAR 2007

Darowicki K, Orlikowski J, Arutunow A, Jurczak W.; Comparative electrochemical analysis of the passive layer cracking process on aluminum alloys performed by means of DC and AC techniques, *JOURNAL OF THE ELECTROCHEMICAL SOCIETY*, Volume: 154 Issue: 2 Pages: C74-C80 Published: 2007

Bogdanowicz R, Ryl J.; Ellipsometric data analysis used in on-line metal passivation monitoring, *EUROPEAN PHYSICAL JOURNAL-SPECIAL TOPICS*, Volume: 144 Pages: 215-220 Published: MAY 2007





Darowicki K, Orlikowski J, Arutunow A, Jurczak W.; The effect of tensile stresses on aluminium passive layer durability, *ELECTROCHIMICA ACTA*, Volume: 51 Issue: 27 Special Issue: Sp. Iss. SI Pages: 6091-6096 Published: AUG 25 2006

Darowicki K, Zielinski A.; Optimal wavelet choice in electrochemical experiments, *FLUCTUATION AND NOISE LETTERS*, Volume: 6 Issue: 2 Pages: L215-L225 Published: JUN 2006

Smulko JM, Darowicki K, Zielinski A.; Evaluation of reinforcement corrosion rate in concrete structures by electrochemical noise measurements, *RUSSIAN JOURNAL OF ELECTROCHEMISTRY*, Volume: 42 Issue: 5 Pages: 546-550 Published: MAY 2006

Darowicki K, Felisiak W.; On the joint time-frequency characteristics of chemical oscillations, *JOURNAL OF COMPUTATIONAL CHEMISTRY*, Volume: 27 Issue: 8 Pages: 961-965 Published: JUN 2006

Darowicki K, Krakowiak S, Ślepski P.; Selection of measurement frequency in Mott-Schottky analysis of passive layer on nickel, *ELECTROCHIMICA ACTA* Volume: 51 Issue: 11 Pages: 2204-2208 Published: FEB 15 2006

Miszczuk A, Darowicki K, Schauer T.; Impedance-based sensing of the interlayer adhesion loss in organic coating systems, *JOURNAL OF SOLID STATE ELECTROCHEMISTRY* Volume: 9 Issue: 12 Pages: 909-913 Published: DEC 2005

Darowicki K, Felisiak W, Zielinski A.; Application of discrete wavelet transform in the analysis of nonlinear chemical system, *JOURNAL OF MATHEMATICAL CHEMISTRY* Volume: 38 Issue: 4 Pages: 701-711 Published: NOV 2005

Darowicki K, Szociński M.; Fatigue damage evaluation of organic coatings subjected to mechanical stress, *DAMAGE ASSESSMENT OF STRUCTURES VI* Volume: 293-294 Pages: 227-233 Published: 2005

Żakowski K, Darowicki K.; Detection of stray current field interference on metal constructions using STFT, *DAMAGE ASSESSMENT OF STRUCTURES VI* Volume: 293-294 Pages: 785-791 Published: 2005



Darowicki K, Orlikowski J, Arutunow A, Jurczak W.; Passive layer cracking studies performed on A95056 aluminum alloy by DEIS and acoustic emission, *ELECTROCHEMICAL AND SOLID STATE LETTERS*, Volume: 8 Issue: 10 Pages: B55-B59 Published: 2005

Krakowiak S, Darowicki K, Ślepski P.; Impedance investigation of passive 304 stainless steel in the pit pre-initiation state, *ELECTROCHIMICA ACTA* Volume: 50 Issue: 13 Pages: 2699-2704 Published: APR 30 2005

Darowicki K, Ślepski P, Szociński M.; Application of the dynamic EIS to investigation of transport within organic coatings, *PROGRESS IN ORGANIC COATINGS* Volume: 52 Issue: 4 Pages: 306-310 Published: APR 1 2005

Orlikowski J, Darowicki K, Arutunow A, Jurczak W.; The effect of strain rate on the passive layer cracking of 304L stainless steel in chloride solutions based on the differential analysis of electrochemical parameters obtained by means of DEIS, *JOURNAL OF ELECTROANALYTICAL CHEMISTRY* Volume: 576 Issue: 2 Pages: 277-285 Published: MAR 1 2005

Krakowiak S, Darowicki K, Ślepski P.; Impedance of metastable pitting corrosion, JOURNAL OF ELECTROANALYTICAL CHEMISTRY, Volume: 575 Issue: 1 Pages: 33-38 Published: JAN 15 2005

Darowicki K., Mirakowski A.: Detection of Corrosion Process in Marine Environment by Means of Acoustic Emission Technique, Polish Journal of Environmental Studies, Volume: 14, Supplement I, Pages 157-160, Published 2005

Darowicki K., Orlikowski J., Arutunow A., Jurczak W.: Novel Method of the Initiation Stage of Stress Corrosion Cracking Monitoring With Respect To Marine Constructions, Polish Journal of Environmental Studies, Volume:14, Supplement I, Pages:161-165, 2 Published 005

Darowicki K., Szociński M.: On Organic Coatings in Marine Applications. Polish Journal of Environmental Studies, Polish Journal of Environmental Studies, Volume: 14, Supplement I, Pages:166-170, Published 2005



Krakowiak S., Darowicki K., Ślepski P.: Pitting Corrosion of Al-Mg Alloys in Chloride Containing Media, Polish Journal of Environmental Studies 14, Supplement I, Pages:171-175, Published 2005

Miszczuk A., Darowicki K.: Evaluation of Coating Systems Using Impedance Spectroscopy, Volume: 14, Supplement I, Pages:176-179, Published 2005

Darowicki K., Zieliński A.: Applications of Electrochemical Noise Technique in Stress Corrosion Cracking Diagnosis, Polish Journal of Environmental Studies, Volume:14, Supplement I, Pages:186-191, Published 2005

Żakowski K, Darowicki K.: Evaluation of Electric Fields Influence on Hyrotechnical Constructions Using STFT, Polish Journal of Environmental Studies, Volume: 14, Supplement I, Pages:192-195, Published 2005

Darowicki K, Felisiak W.: Application of Cohen's class time-frequency distributions in the Belousov-Zhabotinsky reaction analysis, INTERNATIONAL JOURNAL OF BIFURCATION AND CHAOS, Volume: 14 Issue: 10 Pages: 3679-3688 Published: OCT 2004

Darowicki K, Orlikowski J, Arutunow A.; Detection of stress corrosion cracking dynamics by dynamic electrochemical impedance spectroscopy, CORROSION ENGINEERING SCIENCE AND TECHNOLOGY Volume: 39 Issue: 3 Pages: 255-260 Published: 2004

Darowicki K, Orlikowski J, Arutunow A.; Analysis of electrochemical parameters in time domain during the passive layer cracking occurring on the 304L stainless steel in chlorides solution under tensile stresses, ELECTROCHIMICA ACTA, Volume: 49 Issue: 28 Pages: 5069-5078 Published: NOV 1 2004

Darowicki K, Kawula J.; Validity of impedance spectra obtained by dynamic electrochemical impedance spectroscopy verified by Kramers-Kronig transformation, POLISH JOURNAL OF CHEMISTRY, Volume: 78 Issue: 9 Pages: 1255-1260 Published: SEP 2004

Darowicki K, Zielinski A.: The analysis of stationary electrochemical noise, POLISH JOURNAL OF CHEMISTRY Volume: 78 Issue: 9 Pages: 1261-1268 Published: SEP 2004

Darowicki K, Felisiak W.; Time-frequency characteristics of chemical oscillations. Experimental and model studies, POLISH JOURNAL OF CHEMISTRY, Volume: 78 Issue: 9 Pages: 1269-1278 Published: SEP 2004

Darowicki K, Orlikowski J, Arutunow A.; Potential and strain rate impact on the electrochemical properties of 304L stainless steel under tensile stresses, POLISH JOURNAL OF CHEMISTRY, Volume: 78 Issue: 9 Pages: 1811-1822 Published: SEP 2004

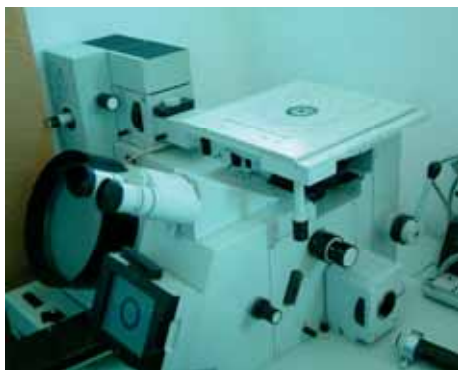


Darowicki K, Szociński M.; Degradation of organic coatings subjected to alternating mechanical stress impact, POLISH JOURNAL OF CHEMISTRY, Volume: 78 Issue: 9 Pages: 1833-1842 Published: SEP 2004

Darowicki K, Kawula J.; Impedance characterization of the process of polyaniline first redox transformation after aniline electropolymerization, ELECTROCHIMICA ACTA Volume: 49 Issue: 27 Pages: 4829-4839 Published: OCT 30 2004

Darowicki K, Zielinski A.; Application of non-stationary techniques in the analysis of electrochemical noise, FLUCTUATION AND NOISE LETTERS Volume: 4 Issue: 2 Pages: L267-L272 Published: JUN 2004

Darowicki K, Ślepski P.; Determination of electrode impedance by means of exponential chirp signal, ELECTROCHEMISTRY COMMUNICATIONS Volume: 6 Issue: 9 Pages: 898-902 Published: SEP 2004



Orlikowski J, Cebulski S, Darowicki K.; Electrochemical investigations of conductive coatings applied as anodes in cathodic protection of reinforced concrete, CEMENT & CONCRETE COMPOSITES, Volume: 26 Issue: 6 Pages: 721-728 Published: AUG 2004

Darowicki K, Krakowiak S, Ślepski P.; The time dependence of pit creation impedance spectra, ELECTROCHEMISTRY COMMUNICATIONS Volume: 6 Issue: 8 Pages: 860-866 Published: AUG 2004

Żakowski K, Darowicki K.; Evaluation and characterization of the condition of individual components of cathodic protection systems, ANTI-CORROSION METHODS AND MATERIALS Volume: 51 Issue: 4 Pages: 253-258 Published: 2004

Darowicki K, Krakowiak S, Ślepski P.; Evaluation of pitting corrosion by means of dynamic electrochemical impedance spectroscopy, ELECTROCHIMICA ACTA Volume: 49 Issue: 17-18 Pages: 2909-2918 Published: JUL 30 2004

Darowicki K.; Third Baltic Conference on Electrochemistry "Corrosion and Materials", JOURNAL OF SOLID STATE ELECTROCHEMISTRY, Volume: 8 Issue: 6 Pages: 337-337 Published: MAY 2004

Darowicki K, Orlikowski J, Arutunow A.; Dynamic electrochemical impedance spectroscopy measurements of passive layer cracking under static tensile stresses.; JOURNAL OF SOLID STATE ELECTROCHEMISTRY, Volume: 8 Issue: 6 Pages: 352-359 Published: MAY 2004

Darowicki K, Felisiak W.; Frequency distribution of chemical oscillations in the closed Belousov-Zhabotinsky reaction, POLISH JOURNAL OF CHEMISTRY Volume: 78 Issue: 4 Pages: 575-582 Published: APR 2004

Darowicki K, Żakowski K.; A new time-frequency detection method of stray current field interference on metal structures, CORROSION SCIENCE, Volume: 46 Issue: 5 Pages: 1061-1070 Published: MAY 2004



Darowicki K, Ślepski P.; Instantaneous electrochemical impedance spectroscopy of electrode reactions, ELECTROCHIMICA ACTA, Volume: 49 Issue: 5 Pages: 763-772 Published: FEB 25 2004

4.2. Another, reviewed publications since 2004

Darowicki K., Szociński M.: Assessment of fatigue damage of organic subjected to cyclic mechanical stress, SURFACE ENGINEERING, Vol. I, 123-126, 2005

Darowicki K., Felisiak W., Zieliński A.: Study on the time-frequency analysis of non-stationary, electrochemical and corrosion processes, SURFACE ENGINEERING, Vol. I, 27-32, 2005

Darowicki K., Zieliński A.: Application of electrochemical noise technique in corrosion monitoring, SURFACE ENGINEERING, Vol. I, 59-62, 2005

Darowicki K., Mirakowski A.: Detection and localization of corrosion process effect by means of acoustic emission technique, SURFACE ENGINEERING, Vol. I, 71-76, 2005

Darowicki K., Orlikowski J., Krakowiak S., Ślepski P.: Automatic system of construction risk assessment, SURFACE ENGINEERING, Vol. I, 89-94, 2005

Jurczak W., Arutunow A.: Long-term researches of stress corrosion cracking of Al-Zn-Mg alloys, SURFACE ENGINEERING, Vol. I, 127-134, 2005

Jurczak W., Orlikowski J.: Stress corrosion cracking of Al-Zn-Mg weldments, SURFACE ENGINEERING, Vol. I, 135-142, 2005

Darowicki K., Orlikowski J., Arutunow A., Jurczak W.: Electrochemical analysis of aluminum passive layer, SURFACE ENGINEERING, Vol. II, 121-128, 2005

Krakowiak S., Darowicki K., Ślepski P., Jurczak W.: Investigation of pitting corrosion of aluminum by using DEIS method, SURFACE ENGINEERING, Vol. II, 129-132, 2005

Żakowski K., Darowicki K.: Time-frequency method of investigation of stray currents interference on underground structures, SURFACE ENGINEERING, Vol. II, 221- 226, 2005

Miszczuk A., Darowicki K.: Quantification of interlayer adhesion in protective coating systems using impedance spectroscopy, SURFACE ENGINEERING, Vol. III, 183-188, 2005

Darowicki K., Kawula J.: Influence of polyaniline primer on the corrosion properties of ST3S steel-coating system, SURFACE ENGINEERING, Vol. III, 197-204, 2005

Klenowicz Z., Darowicki K., Anticorrosion protection of heat exchange, INDUSTRIAL CHEMISTRY, 4, 21-26, 2005

Orlikowski J., Darowicki K., Corrosion monitoring system of water installations - water quality, part. I, INDUSTRIAL CHEMISTRY, 1, 32-33, 2006

Orlikowski J., Darowicki K., Corrosion monitoring system of water installations – water quality. part. II, INDUSTRIAL CHEMISTRY, 2, 23-25, 2006

Ryl J., Darowicki K., Cavitation-erosion, Influence of Electrochemical Corrosion on Cavitations - A Review, PHYSICO-CHEMICAL MECHANICS OF MATERIALS, 1, 102-105, 2006

Krakowiak S., Ślepski P., Comparison of Corrosion Resistance of Al-Alloys by Means of Dynamic Electrochemical Impedance Spectroscopy, PHYSICO-CHEMICAL MECHANICS OF MATERIALS, 1, 370-375, 2006

Orlikowski J., Arutunow A., Jurczak W., Electrochemical Analysis of the Passive Layer Cracking Process on A95052 Aluminium Alloy Performed by Means of DC and AC Techniques, PHYSICO-CHEMICAL MECHANICS OF MATERIALS, 1, 379-384, 2006

Miszczyk A., Using Impedance Spectroscopy to Characterize and Monitor Protection Aspects of Organic Coating Systems on Metal, PHYSICO-CHEMICAL MECHANICS OF MATERIALS ,1, 385-389, 2006

Ślepski P., Leoniak K., Application of the Dynamic Electrochemical Impedance Spectroscopy to Investigation of Spontaneous Electrochemical Oscillations, PHYSICO-CHEMICAL MECHANICS OF MATERIALS,1, 390-393, 2006

Zieliński A., Application of Higher Order Spectra in Harmonic Analysis of Corrosion Process, PHYSICO-CHEMICAL MECHANICS OF MATERIALS, 1, 394-396, 2006

Żakowski K., The Method of Detection of Electromagnetic Fields in Soil, PHYSICO-CHEMICAL MECHANICS OF MATERIALS, 1, 397-399, 2006

Szociński M., Accelerated Degradation of Organic Coatings Due to Cyclic Mechanical Stress, PHYSICO-CHEMICAL MECHANICS OF MATERIALS, 2, 805-808, 2006

Darowicki K., Gerengi H., Bereket G., Ślepski P., Zielinski A., Corrosion behavior of low carbon steel in artificial seawater using TP, LP, EIS, Harmonic Analysis (HA) and new method Dynamic Electrochemical Impedance Spectroscopy (DEIS), THE JOURNAL OF CORROSION SCIENCE AND ENGINEERING, 10, 2006

Darowicki K., Andrearczyk A., Ryl J.: Cuprous oxide formation on copper electrode analyzed with dynamic impedance methods, Ochrona przed Korozją. Issue: Nr 11, Pages: 23-26, 2007

Szociński M., Darowicki K.: Evaluation of organic coating resistance to mechanically induced fatigue, Ochrona przed Korozją, Issue: Nr 11, Pages 65-69, 2007

Darowicki K., Ryl J.: Estimation of erosion-corrosion cavitations failure effects by means of impedance spectroscopy, Issue: 11, Pages 331-334, 2007

Darowicki K., Zieliński Ar. Scanning atomic force microscopy impedance, Ochrona przed Korozją. Issue: Nr 11, Pages: 335-339, 2007

Krakowiak S., Darowicki K.: Application of acoustic emission and dynamic impedance spectroscopy to investigation of corrosion resistance of aluminum alloys. Issue: Nr 11, Pages: 348- 351,2007

Miszczyk A., Darowicki K.: Non-destructive estimation of intercoat adhesion in protective coating systems, Ochrona przed Korozją, Issue: Nr 11, Pages: 363-365, 2007

Ślepski P., Darowicki K.: Impedance measurement by means of frequency scanning, Ochrona przed Korozją. Issue: Nr 11, Pages: 371-376, 2007

Żakowski K., Darowicki K.: Time-frequency analysis of stray current field signals, Ochrona przed Korozją. Issue: Nr 11, Pages: 377-383,2007

Arutunow A., Darowicki K.: DEIS assessment of intergranular corrosion process proceeding on AISI 304 stainless steel, Ochrona przed Korozją. Issue: Nr 11, Pages: 383 – 386, 2007

Orlikowski J., Darowicki K.: Electrochemical investigation of Al.-Mg alloy during tensile stress, Ochrona przed Korozją. Issue: Nr 11, Pages: 387-390, 2007

5. TECHNOLOGICAL ACTIVITY

A vital field of the Department's activity is co-operating with various branches of industry. The range of orders from industry includes: elaboration of anticorrosion protection technologies, selection of construction materials, corrosion risk assessment and corrosion monitoring. A number of expert diagnoses and evidence is given by the Department. This field of activity has an influence on directions of fundamental research. It also modifies and improves didactic programs realized in the Department adjusting them to job market requirements. Employees of the Department are the authors of many patents. The technology of anticorrosion protection of large-diameter tanks and pipelines has been awarded a bronze medal at the international exhibition EUREKA in Brussels.

5.1. Co-operating firms

For many years the Department has been co-operating with a number of clients representing various branches of industry. Such co-operation is facilitated by the fact that corrosion engineers employed in the co-operating units are postgraduates of the Department. They maintain vital contact with us by participation in postgraduate studies, courses and seminars organized by the Department.

<i>Logo</i>	<i>Cooperate</i>
	<i>Alcan Inc.</i>
	<i>Atagor Ltd.</i>
	<i>Belse Ltd.</i>
	<i>BOT Power Plant Bełchatów S.A.</i>
	<i>CTI Industries Inc.</i>
	<i>Delphi Inc.</i>
	<i>Thermal-Electric Power Station Chorzów</i>
	<i>Thermal-Electric Power Station Gdańsk</i>
	
	<i>Elkom Ltd.</i>
	<i>LOTOS Group Inc.</i>
	<i>Żywiec Group Inc.</i>

	<i>GT Corporation Ltd.</i>
	<i>Hempel Inc.</i>
	<i>International Paper Kwidzyn Inc.</i>
	<i>Investa Ltd.</i>
	<i>Brewing Industry Company Inc.</i>
	<i>Korchem K&W Ltd.</i>
	<i>Koreko – Anticorrosion Service Plant Ltd.</i>
	<i>K&W GmbH</i>
	<i>MetPro Group Ltd.</i>
	<i>Maspex Wadowice Group Inc. Tymbark-Olsztynek</i>
	<i>Naftoport Ltd.</i>
	<i>Nitro-Chem, Chemical Plant Inc.</i>
	<i>Oliva Ltd.</i>
	<i>PBG Inc.</i>
	<i>Petrolot Ltd.</i>
	<i>Philips Lighting Polska Inc.</i>
	<i>PKN Orlen Inc.</i>



Polifarb Cieszyn-Wrocław Inc.



Polwar Inc.



Polish Electroenergetic Networks Inc.



SAUR Neptun Gdańsk Inc.



SeCesPol Ltd.



Shipyard Gdynia Inc.



Repair Shipyard Gdańsk Inc.



Unitex Ltd.



*Gdańsk Municipal Board
Environmental Department*



Nitric Plant "Puławy" Inc.



Road and Green Administration, Gdańsk



Marine Military Technologies Center

5.2. Implementations, industrial projects and expertises realized since 2004

K. Darowicki, S. Krakowiak, J. Orlikowski, Elaboration of tank passivation method and supervision over passivation efficiency. Poznań Brewing Company, PG 016033, 2004

K. Darowicki, S. Krakowiak, J. Orlikowski, B. Kempa, T. Sonneck, Complex field investigations of a state of the rubber lining Wikabutyl applied in an absorber of flue gas desulphurization installation. Laboratory investigations of the lining applied on the test panels. KORCHEM K&W Ltd., PG 016214, 2004

K. Darowicki, S. Krakowiak, P. Ślepski, Chemical composition analysis, identification of the reasons of corrosion and materials selection for the filtrate tanks, hot and warm water tanks as well as for leach tanks. International Paper Kwidzyn Inc., PG 016073, 2004

K. Darowicki, S. Krakowiak, Determination of Shore hardness for the following polymer materials: PUR 2K, PUR 3UV. MEGACHEMIE Kraków, PG 016081, 2004

K. Darowicki, B. Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the underground fuel tanks at a filling station in Władysławowo. PKN ORLEN Inc., PG 016063, 2004

K. Darowicki, K. Żakowski, A. Dul, Stray current measurements and analysis of their impact on the bridge over a railway in Gdynia (Stryjska Str.) Road and Bridge Work Company in Płock, PG 016049, 2004



K. Darowicki, Z. Klenowicz, Expertise on VW Golf automotive coating failure. Insurance Company ALLIANZ POLSKA Inc., PG 016064, 2004

K. Darowicki, Z. Klenowicz, Identification of the reasons of organic coating damage in the bag filter of a furnace. Górażdże Group Poland. Electrofilter Plant ELWO Inc., PG 016061, 2004

K. Darowicki, T. Sonneck, Expertise on corrosiveness of the elastic sealer Terostat-998R with respect to PP and PE elements utilized in production of building joinery. Building Joinery Company in Bytów, PG 016044, 2004

K. Darowicki, K. Żakowski, B. Kempa, Statement concerning the necessity of cathodic protection application to the fuel tanks (Pradowo). STACON Sp. J. PKN ORLEN Inc., PG 015985, 2004

K. Darowicki, B. Kempa, A. Dul, Soil corrosiveness assessment and cathodic protection at a filling station in Koszalin (Bohaterów Warszawy 2 Str.). Production and Trade Firm CORRECT in Koszalin, PG 016231, 2004

K. Darowicki, K. Żakowski, B. Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Gdańsk (Grunwaldzka 258 Str.). PKN ORLEN Inc., PG 016238, 2004

K. Darowicki, A. Miszczyk, Selection of corrosion monitoring methods in the oil block of refinery installation. LOTOS Group Inc. in Gdańsk, PG 016213, 2004

K. Darowicki, J. Orlikowski, A. Dul, Hot and cold water corrosiveness monitoring system for the water intake in Straszyn. City of Gdańsk, PG 016259, 2004

K. Darowicki, K. Żakowski, B. Kempa, A. Dul, Maintenance of cathodic protection installation and facilities for the underground pipelines. Fuel Terminal No. 21 in Dębogórze. Anticorrosive Service Plant KOREKO, PG 016260, 2004



K. Darowicki, K. Żakowski, B. Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Gdynia (Kcyńska Str.). PKN ORLEN Inc., PG 016329, 2004

K. Darowicki, K. Żakowski, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Gdańsk (Dąbrowskiego 4 Str.). PKN ORLEN Inc., PG 016329, 2004

K. Darowicki, B. Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Brusy. PKN ORLEN Inc., PG 016329, 2004

K. Darowicki, A. Arutunow, Identification of the reasons of printed circuits' shields corrosion. KIMBAL ELECTRONICS POLAND POZNAŃ, PG 016328, 2004

K. Darowicki, M. Szociński, Translation of an English version of the API standard. PKN ORLEN Inc., PG 016349, 2004

K. Darowicki, B. Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Wiąg. PKN ORLEN Inc., PG 016376, 2004

K. Darowicki, B. Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Człuchów. PKN ORLEN Inc., PG 016376, 2004

K. Darowicki, Z. Klenowicz, Investigation and evaluation of an anticorrosion coating on the steel element of a balcony. Building Company „KOKOSZKI”, PG 016396, 2004

K. Darowicki, T. Sonneck, Production of an anticorrosion agent. Techmasz Mława Ltd., PG 016426, 2004

K. Darowicki, B. Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Kalisz. PKN ORLEN Inc., PG 016447, 2004

K. Darowicki, S. Krakowiak, T. Sonneck, Technical expertise on quality of zinc coatings on the cold-bent, thin-walled steel sheets. Trade and Service Firm KOSZAŁKA Ltd. Kartuzy, PG 016432, 2004

K. Darowicki, S. Krakowiak, J. Orlikowski, B. Kempa, T. Sonneck, Evaluation of a state of chemically resistant, anticorrosion linings protecting internal surfaces of the absorbers of flue gas desulphurization installations. Bełchatów Power Plant Inc., PG 016568, 2005

K. Darowicki, S. Krakowiak, Evaluation of anticorrosion protection of tin-plated bushings and comparison with the same elements additionally protected with the agent Shell Brevis 6200. FEDERAL-MOGUL BIMET, PG 016582, 2005

K. Darowicki, T. Sonneck, Chemical analysis of the automobile switches. DELPHI POLAND Inc. Division Gdańsk, PG 016522, 2005

K. Darowicki, M. Szociński, Translation into English of a report concerning electroless gold deposition on laminates. DELPHI POLAND Inc. Division Gdańsk, PG 016557, 2005

K. Darowicki, B. Kempa, T. Sonneck, Corrosion risk assessment of the automobile switches 8810. DELPHI POLAND Inc. Division Gdańsk, PG 016532, 2005

K. Darowicki, A. Arutunow, Corrosion risk assessment of printed circuits' covers. KINBALL ELECTRONICS POLAND Ltd., PG 016463, 2005

K. Darowicki, K. Żakowski, B. Kempa, A. Dul, Maintenance of cathodic protection installation and facilities for the underground pipelines. Fuel Terminal No. 21 in Dębogórze. Anticorrosive Service Plant KOREKO, PG 016260, 2005

K. Darowicki, S. Krakowiak, J. Orlikowski, A. Arutunow, T. Sonneck, D. Oprawa, Corrosion risk assessment of the U3 installation. International Paper KWIDZYN Inc., PG 016498, 2005

K. Darowicki, A. Miszczyk, M. Szociński, Corrosion risk assessment in the isomerization column of refinery installation. LOTOS Group Inc., PG 016572, 2005



K. Darowicki, A. Miszczyk, M. Szociński, Corrosion risk assessment in a fuel gas pipeline. GRUPA LOTOS Group Inc., PG 016573, 2005

K. Darowicki, J. Orlikowski, S. Krakowiak, P. Ślepski, A. Dul, Corrosion rate monitoring in water supply installations. SAUR NEPTUN Gdańsk Inc., PG 016597, 2005

K. Darowicki, P. Ślepski, Chemical expertise of the railway tanks for transport of mixed acid. NITRO-CHEM Chemical Plant Bydgoszcz Inc., PG 016718, 2005

K. Darowicki, T. Sonneck, Identification of the reasons of corrosion in a brine installation of the dairy in Łowicz. OBRAM Ltd. in Olsztyn, PG 016542, 2005

Darowicki, B.Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Złotowo. PKN ORLEN Inc., PG 016727, 2005

K. Darowicki, B. Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Kłodawa. PKN ORLEN Inc., PG 016683, 2005

K. Darowicki, M. Szociński, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Opalenica. PKN ORLEN Inc., PG 016778, 2005

K. Darowicki, T. Sonneck, Determination of adhesion and tightness of organic coatings in accordance with the specified standards. PROTEX HARMS (Germany), PG016767, 2005

K. Darowicki, Z. Klenowicz, Investigation of the road paints quality. City of Gdynia, PG 016624, 2005

K. Darowicki, B. Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Skórcz (Pomorska Str.). PKN ORLEN Inc., PG 016796, 2005

K. Darowicki, Z. Klenowicz, Corrosion risk assessment of selected steel structures in the Brewing Company in Elbląg. ŻYWIEC Group Inc. in Elbląg, PG 017168 2006

K. Darowicki, B. Kempa, T. Sonneck, Evaluation of coating thickness on the electronic elements and identification of the reasons of the coatings' damage. DELPHI POLAND Inc. Division Gdańsk, PG 016993, 2006

K. Darowicki, P. Ślepski, Corrosion rate measurements of steel structures by a coupon method. International Paper Kwidzyn Inc., PG 016898, 2006

K. Darowicki, T. Sonneck, Expertise on the reasons of corrosion of an expansion tank in Chorzów Power Plant. Foster Wheeler Energy Poland Ltd., PG 016897, 2006

K. Darowicki, B. Kempa, A Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Gdańsk-Rębiechowo (Słowackiego Str.). PETROLOT Ltd., PG 016957, 2006



K. Darowicki, S. Krakowiak, J. Orlikowski, Evaluation of protective coating quality on the main deck and mooring facilities of a ferry. Investigations of „Everdek” coatings. PAINT-INVESTREM in Gdańsk, PG 016971, 2006

K. Darowicki, S. Krakowiak, J. Orlikowski, T. Sonneck, Laboratory investigations of the protective test-plates designated for absorbers and outlet ducts of the flue gas desulphurization systems in Bełchatów Power Plant. Korchem K&W Ltd., PG 016982, 2006

K. Darowicki, K. Żakowski, A. Dul, Anticorrosion protection against stray currents impact of the Siennicki Bridge in Gdańsk. Road and Green Administration in Gdańsk, PG 017020, 2006

K. Darowicki, S. Krakowiak, J. Orlikowski, Evaluation of brewer's wort and young beer impact on passivated steel 304. Brewing Company Inc. in Białystok, PG 017029, 2006

K. Darowicki, S. Krakowiak, J. Orlikowski, A. Zieliński, K. Żakowski, Z. Klenowicz, B. Kempa, T. Sonneck, Corrosion risk assessment of selected steel structures and effectiveness evaluation of existing anticorrosion measures. NAFTOPORT Ltd in Gdańsk – reloading of crude oil and refinery products, PG 017051, 2006

K. Darowicki, B. Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Gdańsk (Świętokrzyska Str.). PKN ORLEN Inc., PG 017076, 2006

K. Darowicki, B. Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Kołczygowice. PKN ORLEN Inc., PG 017147, 2006

K. Darowicki, J. Ryl, T. Sonneck, Investigation of seamed pipes, produced in accordance with the standard EN 10217-7, intergranular corrosion risk assessment according to the standard ISO 3651-2: 1998. SeCeS-Pol Ltd., Nowy Dwór Gdański, PG 017284, 2006

K. Darowicki, Z. Klenowicz, Expertise on technical state of steel structures of 220/110 kV station in Żydowo: evaluation of existing structures with respect to corrosion damage and mechanical failure risk, suggestions concerning renovation of the equipment and steel structures. PSE - PÓŁNOC Ltd., PG 017183, 2006

K. Darowicki, J. Ryl, T. Sonneck, Investigation of seamed pipes, produced in accordance with the standard EN 10217-7, intergranular corrosion risk assessment according to the standard ISO 3651-2: 1998. SeCeS-Pol Ltd., Nowy Dwór Gdański, PG 017145, 2006

K. Darowicki, B. Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Wejcherowo. PKN ORLEN Inc., PG 017212, 2006



K. Darowicki, J. Ryl, R. Bogdanowicz, Scientific expertise evaluating physico-chemical properties of yttrium oxide deposited on glass. Philips Lighting Poland Inc. Piła, PG 017221, 2006

K. Darowicki, Z. Klenowicz, Evaluation of a state of the mobile tanks made of steel 3126 Ti, designated for transport of mixed acid. NITRO-CHEM Chemical Plant Bydgoszcz Inc., PG 017323 2006

K. Darowicki, S. Krakowiak, T. Sonneck, Investigation of water corrosiveness and corrosion risk assessment of galvanized pipe connector. MARWID Gdańsk, PG 017262, 2006

K. Darowicki, J. Ryl, T. Sonneck, Investigation of seamed pipes, produced in accordance with the standard EN 10217-7, intergranular corrosion risk assessment according to the standard ISO 3651-2: 1998. SeCeS-Pol Ltd., Nowy Dwór Gdański, PG 017184, 2006

K. Darowicki, K. Żakowski, B. Kempa, A. Dul, Corrosion risk (due to stray currents) assessment of the protecting tubes, water pipes and heating pipes at a crossing with the Opole-Wrocław railway track in Brzezie. Elkom Ltd. Brzezie, PG 017282, 2006

K. Darowicki, S. Krakowiak, B. Kempa, Pitting corrosion risk assessment of the pipes, identification and characterization of all corrosion damages occurring on delivered elements. EKO-PROD Ltd., PG 017571, 2007

K. Darowicki, Z. Klenowicz, S. Krakowiak, A. Arutunow, B. Kempa, Corrosion risk assessment of laser seams on the pipes made of steel 316L. INVESTA Ltd., PG 017389, 2007

K. Darowicki, S. Krakowiak, B. Kempa, Determination of corrosion rate of the constructional steels during CaCl_2 injection. International Paper Kwidzyn Inc., PG 017362, 2007



K. Darowicki, S. Krakowiak, J. Orlikowski, Corrosion risk assessment of the tanks in the Brewing Company in Białystok. Brewing Company Inc. Poznań, PG 017392, 2007

K. Darowicki, S. Krakowiak, J. Orlikowski, Investigations of passivation quality of a tank in the Brewing Company in Tychy. Brewing Company Inc. Poznań, PG 017461, 2007

K. Darowicki, B. Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Gdańsk (Dąbrowszczaków Str.). PKN ORLEN Inc., PG 017507, 2007

K. Darowicki, B. Kempa, A. Dul, Statement concerning the necessity of cathodic protection application to the fuel tanks at a filling station in Gdynia (Morska Str.). PKN ORLEN Inc., PG 017653, 2007

K. Darowicki, S. Krakowiak, Investigation of salt content on internal surfaces of the absorbers in the flue gas desulphurization systems of Pątnów Power Plant. Evaluation of abrasives used for metal surface preparation. Korchem K&W Ltd., PG 017573, 2007

K. Darowicki, S. Krakowiak, K. Żakowski, Evaluation of quality of the anodes for anticorrosion protection of ballast tanks. Repair Shipyard Gdańsk Inc., PG 017519, 2007

K. Darowicki, J. Orlikowski, B. Kempa, A. Dul, Corrosion rate monitoring in water supply systems. Saur Neptun Gdańsk Inc., PG 017345, 2007

K. Darowicki, P. Ślepski, J. Orlikowski, B. Kempa, T. Sonneck, Corrosion risk assessment of steel and cast iron pipe sections. Saur Neptun Gdańsk Inc., PG 017585, 2007

K. Darowicki, S. Krakowiak, Investigation of effectiveness of the degreasing agent NL 500 for bare metal and coated surfaces. NanoLab Ltd. Katowice, PG 017681, 2007

K. Darowicki, P. Ślepski, T. Sonneck, Impedance measurements of lacquer layer tightness upon exposure to UV radiation, spectrophotometric measurements of the lacquer and passive layer, ellipsometric measurements of the passive layer. METPRO GROUP IRELAND, PG 017714, 2007

K. Darowicki, T. Sonneck, Laboratory investigations of the protective test-plates designated for the flue gas desulphurization systems in Pątnów Power Plant and Bełchatów Power Plant. Korchem K&W Ltd., PG 017715, 2007

K. Darowicki, M. Szociński, Translation of the fragments of an English version of „Degradation Library” – Second Edition. PKN ORLEN Inc., PG 017723, 2007



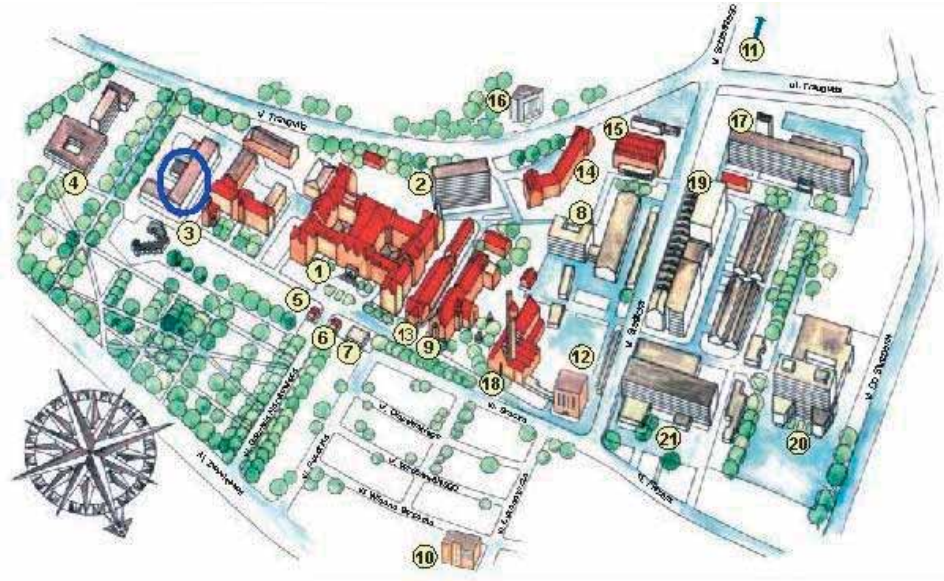
6. PROPOSAL

We are ready to serve with our experience in the field of corrosion prevention. Our proposal includes the following issues:

- Diagnostics of the anticorrosion protection systems designated for environmental protection installations such as flue gas desulphurization installations, electrofilters, waste incinerators, sewage purification plants etc.
- Selection of construction materials for chemical industry installations
- Monitoring of corrosion aggressiveness of water
- Anticorrosion protection of industry and potable water installations
- Design of cathodic protection installation
- Detection and corrosion analysis of electromagnetic fields
- Anticorrosion protection technologies using organic coatings
- Corrosion diagnostics of steel constructions
- Detection of defects and leaks using acoustic emission technique
- Wall and insulation layer thickness measurements using ultrasound method
- Thermovisual analysis of state of objects
- Design and assembling of corrosion monitoring digital systems
- Inspection of protective coatings

The Department conducts educational courses covering the topics of corrosion and anticorrosion protection.

7. CAMPUS MAP



Department of Electrochemistry, Corrosion and Materials Engineering

1. Main Building and Auditorium Maximum
2. Main Building – Extension B
3. Chemical Faculty and Auditorium of Chemistry
4. University Health Centre
5. Lodge
6. Post Office
7. Printing Office
8. Faculty of Hydro and Environmental Engineering
9. Faculty of Electrical and Control Engineering
10. Faculty of Electrical and Control Engineering
11. Faculty of Electrical and Control Engineering
12. Auditorium Novum
13. Faculty of Civil Engineering
14. Faculty of Civil Engineering
15. Students' Centre
16. Faculty of Management and Economics
17. Faculty of Electronics, Telecommunications and Informatics
18. Faculty of Mechanical Engineering
19. Faculty of Mechanical Engineering
20. Faculty of Ocean Engineering and Ship Technology
21. Polish Academy of Science, Institute of Rotating Machinery

