

KORROZIÓS TUDÁS

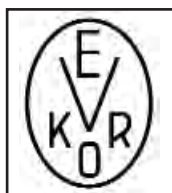
XLVI. évfolyam

2006

TARTALOM

<i>Doma Árpád – Bajári Miklós – Schunk János – Pintér Tamás – Patek Gábor:</i> A Paksi Atomerőmű 2. blokki berendezéseinek és rendszereinek konzerválása a blokk tartós állása idején	3
<i>Zimmer Péter – Lőrincz András:</i> Ivóvízhálózatok mechanikus tisztítása és az eljárások hatékonysága	7
Különleges fémötvözetek I. <i>Nemes Katalin:</i> Elnöki köszöntő	13
<i>Dornbach Gyula:</i> Különleges szerkezeti anyagok a VEGYTERV gyakorlatában	13
<i>Boronyák Imre:</i> Különleges anyagok felhasználásának fejlődése Magyarországon. (Szénacélra plattírozott 18/8 típusú nem rozsdásodó acéllemezek hegesztése során fellépő nehézségek elkerülésének követelményei)	15
<i>Mihala Ferenc:</i> A hazai titánkutatás első lépései	16
<i>Török Tamás:</i> Szemelvények az EUROCORR 2005 konferencia előadásából	19
<i>Mihala Ferenc:</i> Esettanulmány titánberendezés korróziójáról	21
<i>Mihala Ferenc:</i> Egy eredményekben gazdag műszaki pálya során gyűjtött élettapasztalatok	22
Különleges fémötvözetek II. <i>Soós József:</i> Titánkészülékek gyártása	35
<i>Ifj. Bodor János:</i> Hulladékégetők Ni-alapú ötvözetek feldolgozása	36
<i>Buzás Györgyi:</i> Hídszigetelések és sóvédelmi bevonatok alkalmazástechnikai rejtelmek néhány esettanulmány alapján	41
<i>Mohácsi Gábor:</i> A gyorsított légköri korrózió és fényállóság vizsgálata	50
<i>Szabó Sándor – Bakos István:</i> Az oxigén redukciójának katalitikus vonatkozásai	67
<i>Grünwald Ernő – ifj. Várhelyi Csaba – Várhelyi Csaba:</i> Cianmentes rézelektrolitok elterjedése az iparban	74
<i>Lengyel Béla – Horányi György:</i> Környezeti elektrokémia	81
<i>Fortuna László:</i> Problémák festékbevonatok kialakításakor karbantartási és beruházási munkáknál	85
<i>Szabó Róbert:</i> Gondolatok a tartályok belső védelméről I.	87
<i>Vérmeşan, Horaşiu – Grünwald Ernő – Vermeşan, George:</i> Kadmium hatása a környezetre és az egészségre	99
<i>Lingvaj József – Lingvaj Carmen – Öllerer Kinga – Homan Călin – Tankó Ildikó – Ciogescu Ovidiu:</i> Az elektromos földkábelek károsodásának tanulmányozása	102
<i>Rónafalvi Zsolt – Halász László:</i> Csővezeték-integritás, veszély alapú üzemeltetés – olesőbban nagyobb biztonságban	106
<i>Tuisku, Leena:</i> Cinkporos bevonatrendszerek a híd-korrózióvédelemben	108
<i>Jonsson, Bo:</i> Gyakorlati tanácsok és tapasztalatok a híd-korrózióvédelemben	109

<i>Buják Renáta – Varga Kálmán: Adszorpciós jelenségek vizsgálata a Cr(VI) redukciója során polikristályos és (111) orientációjú platinaelektrodokon</i>	123
<i>Buják Renáta – Varga Kálmán: Kis energiájú röntgensugárzó izotópok alkalmazhatóságának vizsgálata az in-situ radioelektrokémiai kutatásokban</i>	133
<i>Pilbáth Aranka – Felhősi Iлона – Kármánné Herr Franciska – Telegdi Judit – Papp Katalin – Kálmán Erika: Cink korrózió elleni védelme környezetbarát difoszfonsavval</i>	141
<i>Mohácsi Gábor: Mérési hibák rétegvastagság mérése során</i>	146
<i>Lábody Imre: Új irányzatok a haszonjárművek (autóbuszok, vasúti kocsik, villamosok) korrózióvédelmében</i>	159
<i>Ifj. Lukács Zoltán: Kérdések és új válaszok a katódos védelmi diagnosztikában</i>	162
<i>Farkas Tibor: Korrózió online monitorozása ipari körülmények között is</i>	167
<i>Jancsó András: Tennivalók az EU új vegyianyag-törvénye kapcsán</i>	168
<i>Köszöntjük a 75 éves Grünwald Ernőt</i>	172



KORRÓZIÓS TUDOMÁNY

XLVI. évfolyam

1. szám

2006

TARTALOM

Doma Árpád – Bajári Miklós – Schunk János – Pintér Tamás – Patek Gábor:
A Paksi Atomerőmű 2. blokki berendezéseinek és rendszereinek konzerválása
a blokk tartós állása idején3

Zimmer Péter – Lőrincz András: Ivóvízhálózatok mechanikus tisztítása
és az eljárások hatékonysága7

Különleges fémötvözetek I.

Nemes Katalin: Elnöki köszöntő13

Dornbach Gyula: Különleges szerkezeti anyagok a VEGYTERV gyakorlatában13

Boronyák Imre: Különleges anyagok felhasználásának fejlődése Magyarországon.
(Szénacélra plattírozott 18/8 típusú nem rozsdásodó acéllemezek hegesztése
során fellépő nehézségek elkerülésének követelményei)15

Mihala Ferenc: A hazai titánkutatás első lépései16

SZEMLE

Török Tamás: Szemelvények az EUROCORR 2005 konferencia előadásából19

Mihala Ferenc: Esettanulmány titánberendezés korróziójáról21

Mihala Ferenc: Egy eredményekben gazdag műszaki pálya során gyűjtött élettapasztalatok22

Rendezvények23

Hírek24

Üzlet26

Folyóiratok tartalmából27

CONTENTS

Á. Doma, M. Bajári, J. Schunk, T. Pintér, G. Patek: Conservation of nuclear power plant
block equipments and systems during long-lasting stop in Paks 3

P. Zimmer, A. Lőrincz: Mechanical cleaning of drinking water networks
and efficiency of the processes7

Special metal alloys I.

K. Nemes: Presidential congratulatory13

Gy. Dornbach: Special structural materials in the practice of VEGYTERV13

I. Boronyák: Development of special materials application in Hungary15

F. Mihala: First steps of titanium research in Hungary16

T. Török: Selected passages from presentations of EUROCORR 200519

F. Mihala: Case-study about corrosion of titanium equipment21

F. Mihala: An experience of life gathered during successful technical career22

SYNOPSIS OF THE PAPERS IN THIS ISSUE***Conservation of nuclear power plant block equipments and systems during long-lasting stop in Paks***

by Á. Doma, M. Bajári, J. Schunk,
T. Pintér and G. Patek

Paksi Atomerőmű Rt. operates 4 VVER 440 type nuclear blocks. In April 2003, there was accident on 2nd block, where nuclear fuel elements had been cleaned. The fuel elements had been damaged, it caused long-lasting stop on the block. During this period, primary and secondary circle technological devices had to be kept in suitable condition with conservation process until restart. The block started in August, 2004. This article shows the applied conservation technologies.

Mechanical cleaning of drinking water networks and efficiency of the processes

by P. Zimmer and A. Lőrincz

In drinking water networks, depositions and precipitations causes several troubles for operators and consumers. The quality of transported water is getting worse, color, taste and smell problems may occur, and harmful bacteriological and biological life may form in the pipeline. Precipitations adhered into pipe wall with large force change the hydraulic relations first of all. The method of deposition protection can be the application of removal processes beyond prevention. The practical experiences show that only some kind of pipe cleaning application can remove depositions efficiently. The used processes are the following: chemical processes, high pressure hydraulic processes and mechanical processes. The article describes the used processes, and the valuation of the transportation parameter tests had been made after the cleaning.

Special structural materials in the practice of VEGYTERV

by Gy. Dornbach

The short communication summarizes those special structural materials, which had the author been met in their 45 years practice in the chemical industry.

Development of special materials application in Hungary

by I. Boronyák

The author has experiences in processing of 400 tons of clad metal. This article summarizes the requirements of bypassing problems occurring during welding of 18/8 type stainless steel-clads grouped by the followings: geometrical conditions, basic welding conditions, role of ferrite in weld and valuation of weld quality.

First steps of titanium research in Hungary

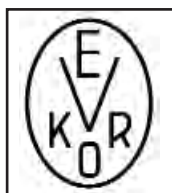
by F. Mihala

In this short communication, the author summarizes the first steps of his titanium program, the researches they have been made and the problems had been occurred during titanium processing.

Selected passages from presentations of EUROCORR 2005

by T. Török

The paper shows few selected passages from 50th jubilee program of European Federation of Corrosion in the topic of surface treating and coating process the viewpoint of a metallurgical engineer.



KORRÓZIÓS TUDOMÁNY

XLVI. évfolyam

2. szám

2006

TARTALOM

Különleges fémötvözetek II.

<i>Soós József: Titánkészülékek gyártása</i>	35
<i>Ifj. Bodor János: Hulladékégetők Ni-alapú ötvözeteinek feldolgozása</i>	36

SZEMLE

<i>Buzás Györgyi: Hídszigetelések és sóvédelmi bevonatok alkalmazástechnikai rejtelmek néhány esettanulmány alapján</i>	41
<i>Mohácsi Gábor: A gyorsított légköri korrózió és fényállóság vizsgálata</i>	50
Rendezvénybeszámoló a VEKOR tavaszi konferenciájáról	55
Rendezvények	56
Hírek	57
Üzlet	59
Folyóiratok tartalmából	60

CONTENTS

Special metal alloys II.

<i>J. Soós: Manufacturing titanium appliances</i>	35
<i>J. Bodor jr.: Processing Ni-based alloys of destructors</i>	36
<i>Gy. Buzás: Application technology mysteries of bridge insulations and salt protection coatings on the basis of some case study</i>	41
<i>G. Mohácsi: Accelerated atmospheric corrosion and light stability test</i>	50

SYNOPSIS OF THE PAPERS IN THIS ISSUE***Manufacturing titanium appliances***

by J. Soós

Due to its remarkable corrosion resistance, titanium has been used for structure material since the fifties. TiszaKécske plant of VEGYÉPSZER Company has engaged in manufacturing and fixing titanium appliances since 1974. In this short paper, the author shares his experiences during his long period practice.

Processing Ni-based alloys of destructors

by J. Bodor jr.

Due to increasing of waste producing, in Europe, refuse destructors appear more and more numbers. The most important part of a destructor is the combustion chamber where the waste is being burned in a grid. The formed smoke contains high volume chlorine and sulphur derivatives, which can damage the chamber. If the chamber made of carbon steel, it would get spoiled soon. A modern solution is to coat the membrane walls with a well resisting alloy, for instance Inconel 625. One low cost way is the cladding method opposite to compound pipe solution. The article shows a technical novelty about manufacturing membrane walls by surface-layer welding.

Accelerated atmospheric corrosion and light stability test

by G. Mohácsi

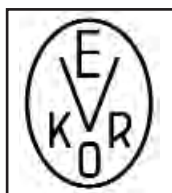
Light, high temperature and moisture can damage paints, plastics and other organic materials. This dam-

age can be fading, discolouration, yellowing, cracking, peeling, flaking, losing strength, being fragile. Accelerated atmospheric corrosion and light stability test devices are widely applied for research, quality control and examination of materials. These devices give quick and repeatable result. Recently, cheap and easy to use laboratory test devices have been developed, like QUV (UV tube lamp) and Q-Sun (Xenon-lamp) testers. The xenon-lamp tester simulates the whole spectrum of the sunlight including of ultraviolet, visible and infra-red light. The UV lamp only reproduces the harmful rays of sunlight between 300 and 400 nm. The article helps to find the best device and way to test different materials for the given purpose.

Application technology mysteries of bridge insulations and salt protection coatings on the basis of some case study

by Gy. Buzás

Sto Építőanyag Kft. has two main business, first is called "vertical business" and it is specialized on front heat insulations, different frontal systems, acoustical inside surfacing etc, and the other is the "horizontal business" with resin floors, protecting coatings for passable surfaces, bridge insulations and salt protection systems. This paper deals with the execution and quality control of insulation works of the newest Hungarian bridges.



KORROZIÓS FIGYELŐ

XLVI. évfolyam

3. szám

2006

TARTALOM

<i>Szabó Sándor – Bakos István: Az oxigén redukciójának katalitikus vonatkozásai</i> . . . . .	.67
<i>Grünwald Ernő – ifj. Várhelyi Csaba – Várhelyi Csaba: Ciánmentes rézelektrolitok elterjedése az iparban</i> . . . . .	.74
<i>Lengyel Béla – Horányi György: Környezeti elektrokémia</i> . . . . .	.81

SZEMLE

<i>Fortuna László: Problémák festékbevonatok kialakításakor karbantartási és beruházási munkáknál</i> . . . . .	.85
<i>Szabó Róbert: Gondolatok a tartályok belső védelméről I.</i> . . . . .	.87
<i>Rendezvénybeszámoló az URB-CORR konferenciáról</i> . . . . .	.90
<i>Rendezvények</i> . . . . .	.92
<i>Hírek</i> . . . . .	.92
<i>Üzlet</i> . . . . .	.93
<i>Folyóiratok tartalmából</i> . . . . .	.95

CONTENTS

<i>S. Szabó, I. Bakos: Catalytic aspects of oxygen reduction</i> . . . . .	.67
<i>E. Grünwald, Cs. Várhelyi jr., Cs. Várhelyi: Using of cyanide free copper electrolytes in industry</i> . . . . .	.74
<i>B. Lengyel, G. Horányi: Environmental electrochemistry</i> . . . . .	.81
<i>L. Fortuna: Problems of coating application on renovation and project works</i> . . . . .	.85
<i>R. Szabó: About inside protection of tanks I.</i> . . . . .	.87

SYNOPSIS OF THE PAPERS IN THIS ISSUE

Catalytic aspects of oxygen reduction

by S. Szabó and I. Bakos

Reduction of oxygen is a multi-step catalytic process. On metal surfaces this process sometimes starts with dissociative adsorption of oxygen molecules, and then reduction of oxygen atoms takes place. When the dissociative adsorption is impossible then superoxide ion is formed at first. The superoxide ion is reduced further and hydrogen peroxide is formed as an intermedier.

The most common oxygen activator is the acidic $\text{Fe}^{3+}/\text{Fe}^{2+}$ -chloride system, which is a well known etching agent.

On corroded iron surfaces the Fe^{2+} containing lepidocrocite is the catalyst of the oxygen reduction, which is the cathodic process of the corrosion.

There are several oxygen activators among the manganese and copper compounds, as well.

Using of cyanide free copper electrolytes in industry

by E. Grünwald, Cs. Várhelyi jr. and Cs. Várhelyi

In the last 3 decade, application of functionally used electro galvanized and chemical plated copper coatings has been greatly increased. The possibility, that the very good electric conduction copper can be deposited with thin layers with new optimized technologies into non conductive surfaces, began large development in the field of electronics and other industrial domains. The copper is widely used for electroforming, plating of cylinders, making of printed wiring plates, protecting of steel parts before selective heat treatment etc. The characteristic of deposited copper layer depends on the used electrolyte and the parameters of deposition. In this paper, different type of cyanide free electrolytes are presented with its application fields. Also the large significance, environmental friendly and non toxic phosphonate based electrolyte is discussed. And finally, features of phosphate free semibright copper electrolyte (has been successfully used in Romania for 5 years by COVENTYA company) is examined.

Environmental electrochemistry

by B. Lengyel and G. Horányi

In the paper the following electrochemical aspects of the field of Environmental Chemistry has been presented:

1. Direct and indirect electrochemical methods and technologies (electrochemical "incineration" of organic species, cyanides, electroflotation and coagulation of emulsions, elimination of metal ions from waste waters).
2. The electrochemistry of procedures applied for environmental protection. Electrochemical aspects of reductive elimination processes using metals or applying catalytic methods. (Denitrification, elimination of perchlorates and arsenic compounds.)
3. Minimizing of the contaminations caused by electrochemical systems.

Problems of coating application on renovation and project works

by L. Fortuna

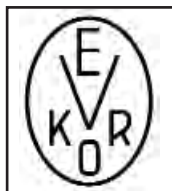
Before we give quotation for renovation, maintenance and project works, we have to make careful consideration. Also the responsibility of customers has to be bigger when ordering these surface protection works. This article compares 8 basic questions between the 2 kinds of execution work. Of these, 6 look the same, however it is evident from the answers that renovation and maintenance work is quite different than the project work.

"What are the quality demands?" – "When do we make the maintenance of the coating system?" – "When and how deep does it worth making the workshop tasks?" – "When do we have to remove the completed coating?" Such and similar questions and answers have been arisen. Lots of discussion and guarantee problem would be avoided if we paid attention better to these questions.

About inside protection of tanks I.

by R. Szabó

Protection against corrosion can be many kinds. It depends on the shape, size and the material of the tanks, the corrosion agent and the economical factors. In this paper, the most common protection methods are summarized, in a perspective of a 30 000 m³ steel tank. The protection methods are divided into 3 categories: active, passive and defense with inhibitors. Also the protections of tanks were examined from the point of view of static charge and explosion risk.



KORRÓZIÓS FIGYELŐ

XLVI. évfolyam

4. szám

2006

TARTALOM

<i>Vermeşan, Horaşiu – Grünwald Ernő – Vermeşan, George: Kadmium hatása a környezetre és az egészségre</i> . . . . .	.99
<i>Lingvay József – Lingvay Carmen – Öllerer Kinga – Homan Călin – Tankó Ildikó – Ciogescu Ovidiu: Az elektromos földkábelek károsodásának tanulmányozása</i> . . . . .	.102

SZEMLE

<i>Rónafalvi Zsolt – Halász László: Csővezeték-integritás, veszély alapú üzemeltetés – olcsóbban nagyobb biztonságban</i> . . . . .	.106
<i>Tuisku, Leena: Cinkporos bevonatrendszerek a híd-korrózióvédelemben</i> . . . . .	.108
<i>Jonsson, Bo: Gyakorlati tanácsok és tapasztalatok a híd-korrózióvédelemben</i> . . . . .	.109
Rendezvények . . . . .	.111
Hírek . . . . .	.111
Üzlet . . . . .	.114
Folyóiratok tartalmából . . . . .	.117

CONTENTS

<i>H. Vermeşan, E. Grünwald, G. Vermeşan: Effect of cadmium on the environment and health</i> . . . . .	.99
<i>J. Lingvay, C. Lingvay, K. Öllerer, C. Homan, I. Tankó, O. Ciogescu: Contributions to the study of the degradation of the underground power cables</i> . . . . .	.102
<i>Zs. Rónafalvi, L. Halász: Analysis of risk and consequence during operating pipelines</i> . . . . .	.106
<i>L. Tuisku: Zinc-rich coating systems in corrosion protection of bridges</i> . . . . .	.108
<i>B. Jonsson: Practical advices and experiences in corrosion protection of bridges</i> . . . . .	.109

SYNOPSIS OF THE PAPERS IN THIS ISSUE***Effect of cadmium on the environment and health***
by H. Vermeşan, E. Grünwald and G. Vermeşan

Cadmium is widely used in the industrial fields due to its excellent features. However cadmium-plate technologies and the presence of cadmium are negative to the environment and health, because it is one of the most toxic metals. For decreasing cadmium poisoning, we have to keep laws and work protection rules, and permanent medical control is needed. On the basis of all these we have to ban cadmium and compounds in the future. Thus new experiment and researches have to be done to find the suitable and efficient alternative.

Contributions to the study of the degradation of the underground power cables

by J. Lingvay, C. Lingvay, K. Öllerer,
C. Homan, I. Tankó and O. Ciogescu

We have analyzed the principal materials that are determining the exploitation safety of cables afferent to the underground power lines. Therefore, we have experimentally determined the resistance of the polymeric (PVC) material, from which the protecting layer of medium voltage cables is made, to the action of fungi's. We have analyzed the degradation causes of the dielectric rigidity of underground power lines.

Analysis of risk and consequence during operating pipelines

by Zs. Rónafalvi and L. Halász

In addition to visible and perceptible social benefits, every human activity causes undesirable effects. These

effects are used to call risk, which is the summary of the probability of undesirable events and their consequences. Operation of every pipeline system carries danger. Unfortunately, in case of industrial devices or hazardous material transporting pipelines, there is no chance to reduce the risk into zero. Therefore it is very important to handle and value the threat in the proper way to reduce the risk into acceptable level.

Zinc-rich coating systems in corrosion protection of bridges

by L. Tuisku

This paper deals with zinc-rich primers, which are used for corrosion protection of bridges. The defending mechanism of these primers is the cathodic protection, thus appropriate amount of zinc is very important. This paper compare numerous coating system used in several countries in the viewpoint of zinc content, and the standards, coating systems have to be adjusted.

Practical advices and experiences in corrosion protection of bridges

by B. Jonsson

The most of the coating systems are well quality, notwithstanding for bridge application only certified coating systems must be used. Supervising of the coating work is also very important. Discussion and control of guarantee questions have to be done. Quality of steel structures and surfaces are also significant. This paper presents the circumstances and process of bridge painting works in Sweden and the applied coating systems.



KORRÓZIÓS TUDOMÁNY

XLVI. évfolyam

5. szám

2006

TARTALOM

<i>Buják Renáta – Varga Kálmán: Adszorpciós jelenségek vizsgálata a Cr(VI) redukciója során polikristályos és (111) orientációjú platinaelektrodokon</i>	123
<i>Buják Renáta – Varga Kálmán: Kis energiájú röntgensugárzó izotópok alkalmazhatóságának vizsgálata az in-situ radioelektrokémiai kutatásokban</i>	133
<i>Pilbáth Aranka – Felhősi Ilona – Kármánné Herr Franciska – Telegdi Judit – Papp Katalin – Kálmán Erika: Cink korrózió elleni védelme környezetbarát difoszfonsavval</i>	141

SZEMLE

<i>Mohácsi Gábor: Mérési hibák rétegvastagság mérése során</i>	146
<i>Rendezvénybeszámoló a vekor őszi konferenciájáról</i>	147
<i>Rendezvények</i>	149
<i>A vegyészmérnöki tagozat felhívása a vegyész- és biomérnöki tervezői és szakértői jogosultságokba történő átsorolás kezdeményezésére</i>	149
<i>Hírek</i>	150
<i>Üzlet</i>	152
<i>Folyóiratok tartalmából</i>	153

CONTENTS

<i>R. Buják, K. Varga: In-situ radiotracer and voltammetric study of the formation of surface adlayers in the course of Cr(VI) reduction on polycrystalline and (111) oriented platinum</i>	123
<i>R. Buják, K. Varga: On the applicability of low energy X-ray emitters in the in-situ radiotracer adsorption studies</i>	133
<i>A. Pilbáth, I. Felhősi, F. Herr-Kármán, J. Telegdi, K. Papp, E. Kálmán: Protection of zinc against corrosion with environment-friendly diphosphonic acid</i>	141
<i>G. Mohácsi: Errors at measuring of layer thickness</i>	146

SYNOPSIS OF THE PAPERS IN THIS ISSUE

In-situ radiotracer and voltammetric study of the formation of surface adlayers in the course of Cr(VI) reduction on polycrystalline and (111) oriented platinum

by R. Buják and K. Varga

This paper is focused on the in-situ radiotracer and voltammetric studies of the induced $\text{HSO}_4^-/\text{SO}_4^{2-}$ adsorption at Pt(poly) and Pt(111) surfaces in $0.1 \text{ mol}\cdot\text{dm}^{-3}$ HClO_4 solution in the course of Cr(VI) electro reduction. Besides this, the sorption behavior of $\text{HSO}_4^-/\text{SO}_4^{2-}$ -ions on bare Pt(poly) and Pt(111) electrodes is compared and discussed. From the experimental results it can be stated that:

1. Although the extent of bisulfate/sulfate adsorption is strongly dependent upon the crystallographic orientation of Pt surfaces, the maximum coverage on the Pt(111) does not exceed 0.2 monolayer.
2. The Cr(VI) electro reduction on both poly- and (111) oriented platinum proceeds via a ce (chemical-electron-transfer) mechanism to yield Pt surfaces covered with intermediate surface adlayers containing Cr(VI) particles (and reduced Cr-containing adspecies) and 'strongly bonded' $\text{HSO}_4^-/\text{SO}_4^{2-}$ -ions.
3. While the coverage of platinum surfaces by the intermediate complexes formed in the course of Cr(VI) electro reduction at $E > 0.20 \text{ V}$ is basically independent of the crystallographic orientation of the Pt electrode, the onset for rapid Cr(VI) reduction is highly affected by the nature and crystallographic orientation of the electrode.

On the applicability of low energy X-ray emitters in the in-situ radiotracer adsorption studies

by R. Buják and K. Varga

In the present work, main issues of the methodology and applicability of the in-situ radiotracer "thin gap" method were presented and discussed. In addition, the electro reduction of Cr(VI) species on Pt electrode was investigated by measuring the low energy ($E = 4,90 \text{ keV}$) X-rays of ^{51}Cr used for labelling. Two types of scintillation crystal such as 2 mm thick β -plastic and 300 μm thick $\text{CaF}_2(\text{Eu})$

were tested for nuclear detection. The results imply that the no plastic scintillator can be utilized for selective measurement of the soft X-rays emitted by ^{51}Cr , hence it does not allow us to estimate the surface excess of chromium containing species on Pt electrode. In contrast to this, the $\text{CaF}_2(\text{Eu})$ is suitable for selective detection of the low-energy X-rays. Therefore, the radio electrochemical cell equipped with this scintillator provides very promising measuring conditions for the extension of the radiotracer "thin gap" method towards application of the low-energy X-ray emitters.

Protection of zinc against corrosion with environment-friendly diphosphonic acid

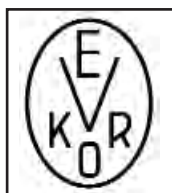
by A. Pilbáth, I. Felhősi, F. Herr-Kármán, J. Telegdi, K. Papp and E. Kálmán

In the past few years, claim to good quality zinc coated steels have been increased all over the world. The formed zinc surface on the hot-dip galvanized steel has good cathodic protection properties. Further corrosion protection of metal surfaces can be several processes, for example one of the most sufficient is the chromate treatment. It is a disadvantage fact of the chromating processes that the oxidized chromium compounds (Cr-VI) are very poisonous to the environment and the health, and from the year 2007 will be limited and banned in the European Union. Thus all over the world scientist try to develop environmental friendly chromium substituent materials. This paper shows tests results of protecting effect of different chain length diphosphonic acids [$\text{H}_2\text{O}_3\text{P}-(\text{CH}_2)_n-\text{PO}_3\text{H}_2$, $n = 5, 7, 8, 12$] in unalloyed zinc.

Errors at measuring of layer thickness

by G. Mohácsi

Numerous measuring principles are known for layer thickness measuring, but only two methods are used widely: magnetic induction method for magnetizable (steel) surfaces and eddy-current instruments for non magnetizable surfaces. The execution of the measuring is very simple, but many factors can influence its accuracy and adequacy. The paper lists these factors.



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TARTALOM

<i>Lábod Imre:</i> Új irányzatok a haszonjárművek (autóbuszok, vasúti kocsik, villamosok) korrózióvédelmében	159
<i>Ifj. Lukács Zoltán:</i> Kérdések és új válaszok a katódos védelmi diagnosztikában	162

SZEMLE

<i>Farkas Tibor:</i> Korrózió online monitorozása ipari körülmények között is	167
<i>Jancsó András:</i> Tennivalók az EU új vegyianyag-törvénye kapcsán	168
Köszöntjük a 75 éves Grünwald Ernőt	172
Rendezvénybeszámoló. Korróziós és korrózióvédelmi konferencia Kolozsvárott	173
Rendezvények	174
Hírek	174
Folyóiratok tartalmából	177
2006. évi betűrendes tartalomjegyzék, névmutató, tárgymutató	181

CONTENTS

<i>I. Lábod Imre:</i> New horizons in the corrosion protection of buses, railroad coaches and tramcars	159
<i>Z. Lukács Zoltán jr.:</i> Questions and new answers in the cathodic protection diagnostic	162
<i>T. Farkas:</i> Online measuring of corrosion	167
<i>A. Jancsó:</i> Tasks in connection with the new chemical law of EU	168
Ernest Grünwald's salutation on his 75 th birthday	172

SYNOPSIS OF THE PAPERS IN THIS ISSUE***New horizons in the corrosion protection of buses,
railroad coaches and tramcars***

by I. Lábódy

Comfort increasing of cars requires powerful development of public transports also. People travel by bus or tram only if comfort, safety and traveling time is competitive with cars. For that purpose, faster, more comfortable and well-equipped vehicles have been made. Manufacturing costs are higher, but it can be compensate with higher lifetime and better exploitation. Therefore maintenance and repairing periods must be increased. This paper describes what changing is ensuing in the field of corrosion protection (structure materials, construction solutions, new coatings, nanotechnology) due to higher demands.

***Questions and new answers in the
cathodic protection diagnostic***

by Z. Lukács jr.

In the past two decades the measurement techniques have changed enormously in the field of cathodic protection diagnostics. In contrast, the methods of evaluation of the measured data remained practically unchanged. This fact resulted in an especially great lag in the diagnostics of sacrificial anodes and stray current affected CP systems. Some other fields, e.g. the diagnostics of the cathodic protection of well casings is also a problem to be solved in the near future.

The publication, completed with a case study, draws the outlines of a novel approach in the solution of these problems and discusses the principles of a

unified CP diagnostic system consistent with recent trends in industrial quality assurance.

Online measuring of corrosion

by T. Farkas

In industry, corrosion causes significant damages year by year. Consequently, different corrosion measuring techniques are used for a long time, but most of these solutions can not bring in resounding successes for the users. Among others, the reason for this is that these techniques can give only approximate rate of corrosion in case of general corrosion, but in industry the 70–90% of damages are pitting corrosion. Other significant problem is that the general measuring methods use infrequent sampling technique, which does not give accurate result, and also a disadvantage that only gives post-results, when corrosion damages had happened already. Apart from LPR method, there is no other corrosion measuring method which can be integrated into any control system, so this is a systems engineering problem. This short article presents a new transmitter product of Pepperl+Fuchs company, which for the moment the only one device in the market, able to measure the real time local corrosion, and can be integrated into control systems.

Tasks in connection with the new chemical law of EU

by A. Jancsó

The article presents the new European chemical law (REACH) which is in progress and those most important tasks, that chemical companies and other businesses have to do before and after the law comes into force.