

LABAT'89

29 May – 02 June 1989, Varna, Bulgaria

presented papers

POSITIVE PLATE

The PbO₂ Particles of the Positive Active Mass - a Complex Open Electrochemical System

D.Pavlov, Central Laboratory of Electrochemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria

Two Phenomena in the Interface Between Positive Active Material and Lead Calcium Grid

K.Takahashi, N.Hoshihara, H.Yasuda, H.Jinbo, Matsushita Battery Industrial Co. Ltd., Sakaijuku kosai Shizuoka, Japan

The Behaviour of the PbO₂/PbSO₄ Electrode in Tin Ions Containing H₂SO₄ Electrolyte

E.Voss, U.Hullmeine, A.Winsel, VARTA Batterie A.G., Forschungs- und Entwicklungszentrum, Kelkheim, FRG

Currentless Passivation of the PbO₂ Electrode with Respect to the Influence of Sn

H.Doering, J.Garche, H.Dietz, K.Wiesener, Dresden University of Technology, Dresden, DDR

Crystal Growth of PbO₂ and its Relation to the Capacity Loss of the Positive Plate in Sealed Lead-Acid Batteries

J.Yamashita, H.Yufu, Y.Matsumaru, Yuasa Battery Co. Ltd., Osaka, Japan

Passivation of the Positive Electrode of the Lead-Acid Battery - a Consequence of the Selfdischarge

J.Garche, Dresden University of Technology, DDR

The Oxidation Mechanism of Lead Sulfate Formed on the Grid in Sulphuric Acid Solution

Z.Takehara, Kyoto University, Kyoto, Japan

Degradation of the Positive Plate in the Lead-Acid Battery during Cycling

S.Atlung, B.Zachau-Christiansen, The Technical University of Denmark, Lyngby, Denmark

Survey of the Aims and Content of LEADSCAN - a Quarterly Journal Concerned with the Lead Industry

G.Margulis, Lead Development Association, London, England

The Behaviour of the PbO₂/PbSO₄ Electrode in Dependence of Charge Regimes and Small Amounts of H₃PO₄ in the H₂SO₄ Electrolyte

U.Hullmeine, E.Voss, A.Winsel, VARTA Batterie A.G., Forschungs- und Entwicklungszentrum, Kelkheim, FRG

Effect of Activators and Inhibitors on the Positive Active Material of Lead-Acid Battery Electrodes

E.Hasik, M.Paszkiwicz, Central Laboratory of Batteries and Cells, Poznan, Poland

Processes at PbSO₄ Oxidation to PbO₂ During Positive Plate Charge as Reflected at Microlevel

D.Pavlov, E.Bashtavelova, Central Laboratory of Electrochemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria

D.Simonsson, P.Ekdunge, Royal Institute of Technology, Stockholm, Sweden

Mechanism of Pb/PbSO₄ and PbO₂/PbSO₄ Processes

V.Gontcharov, Novotcherkassk Polytechnical Institute, Novotcherkassk, USSR

Considerations to the Insertion Mechanism of the Lead Dioxide Electrode

H.W.Uhlig, VEB Berliner Akkumulatoren und Elementen-fabrik, Berlin, DDR

SMOOTH ELECTRODE

Influence of Antimony on the Electrochemical Behaviour of Pb Electrodes in H₂SO₄

D.Pavlov, B.Monahov, M.Bojinov, Central Laboratory of Electrochemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria
G.Sundholm, T.Laitinen, Helsinki University of Technology, Espoo, Finland

Film Formation in the Pb/H₂SO₄ System at the Pb(II) Region

L.A.Avaca, E.R.Gonzalez, G.Tremiliosi-Filho, Grupo de Eletroquimica IFQSC/USP, Sao Carlos, Brazil
C.V.D'Alkaine, Grupo de Eletroquimica DQ-UFSCar, Sao Carlos, Brazil

Study of the Electrode Processes in the Pb/H₂SO₄+ Additives System

S.Sternberg, V.Branzoi, Politechnic Institute of Bucharest, Bucharest, Romania
L.Apateanu, Biochemical and Chemical Energetics Institute, Bucharest, Romania

Posters:

Processes at Oxidation of PbO.PbSO₄ Crystals to PbO₂ Agglomerates During Lead-Acid Battery Positive Plate Formation

D.Pavlov, E.Bashtavelova, Central Laboratory of Electrochemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria

Structure of the PbO₂ Particles of Lead-Acid Battery Positive Plate Active Mass

I.Balkanov, D.Pavlov, Central Laboratory of Electro-chemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria
P.Rachev, Central Institute of Computer Technics and Technology, Sofia, Bulgaria

Influence of Sb, As and Bi on the Reversibility of Processes Occuring at the PbO₂ Plate During Cycling

D.Pavlov, A.Dakhouché, T.Rogachev, Central Laboratory of Electrochemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria

Corrosion of Lead Alloys at Reversal Polarization

Z.Georgiev, Higher Institute of Chemical Technology, Sofia, Bulgaria

MODELLING

Modelling the CCA Performance of SLI Batteries

M.T.Loponen, P.Jalas, NESTE Oy, Corporate R & D, Porvoo, Finland

A Simple Model of the Lead-Acid Battery

M.Maja, P.Spinelli, Politecnico di Torino, Torino, Italy

The PbO₂/PbSO₄ Electrode as an Example of a "Kugel-haufen" Electrode

A.Winsel, E.Voss, U.Hullmeine, VARTA Batterie A.G., Forschungs- und Entwicklungszentrum, Kelkheim, FRG

Mathematical Modelling of a Lead-Acid Battery with Tubular Electrodes

O.E.Abdel-Salam, University of Science and Technology, Irbid, Jordan

Mathematical Models for the Anodic Polarization Curves of the Positive Electrode

P.Bjornbom, The Royal Institute of Technology, Stockholm, Sweden

Mathematical Modelling of the Current-Potential Curves Obtained in the Pb/H₂SO₄ System

S.Sternberg, V.Branzoi, Politechnic Institute of Bucharest, Bucharest, Romania

L.Apateanu, Biochemical and Chemical Energetics Institute, Bucharest, Romania

NEGATIVE PLATE

Effect of Organic Additives on Negative Mass

S.L.Gust, E.Haameenoja, NESTE Oy, Corporate R & D, Porvoo, Finland

J.Ahl, T.Laitinen, A.Savonen, G.Sundholm, Helsinki University of Technology Espoo, Finland

The Design of Additives to Enhance the Performance of the Lead Anode in Sulphuric Acid

B.H.Simon, I.G.Mawston, G.A.Wright, University of Auckland, Auckland, New Zealand

Corrosion of the Pb-Sb Alloy as Negative Plate Grid in H₂SO₄ Solution

S.N.Hua, Y.Guo, Z.G.Nang, Shandong University, Shandong, China

Theoretical and Experimental Studies of Free Convection and Stratification of Electrolyte in a Lead-Acid Cell

A.Eklund, D.Simonsson, F.Alavyoon, R.Karlsson, F.H.Bark, The Royal Institute of Technology, Stockholm, Sweden

Method for Measurement of the Lead-Acid Battery Internal Resistance During Charge and Discharge

K.Kordesch, Technical University, Graz, Austria

Effect of Silicate and Antimonate Additives on Hydrogen Evolution on the Porous Lead Electrode in Sulphuric Acid

K.Vijaymohan, S.Sathyannarayana, Indian Institute of Science, Bangalore, India

S.N.Joshi, UB-MEK Batteries Ltd., Bangalore, India

MEASUREMENT METHODS

Impedance of Porous Electrochemical Systems. Active Mass of Lead-Acid Battery

K.V.Rybalka, L.A.Beketaeva, Frumkin Institute of Electrochemistry, Moscow, USSR

Nonstationary Impedance Analysis of Lead-Acid Batteries

Z.Stoynov, B.Savova-Stoynova, T.Kossev, Central Laboratory of Electrochemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria

Impedance Measurements of Lead Sodium Sulphate Solution Electrode System - Synthesis of AC Analogue Circuit

M.Bojinov, B.Monahov, Central Laboratory of Electrochemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria

Impedance Study of the Intercell Welds of SLI Batteries

Z.Stoynov, B.Savova-Stoynova, T.Kossev, Central Laboratory of Electrochemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria

Automatic Control of Through-Wall Intercell Connections of Automotive Lead-Acid Batteries

P.Horvath, E.Kadar, S.Kulcsar, Research Institute of Electrical Industry, Budapest, Hungary

Time Effects in Conductivity Measurements of Lead-Acid Battery Electrodes

M.Calabek, Technical University, Brno, CSSR

K.Micka, Heyrovsky Institute, Prague, CSSR

Measurement of Contact Resistances between Active Mass and Current Collector in Lead-Acid Battery Electrodes

K.Micka, Heyrovsky Institute, Prague, CSSR

M.Calabek, Technical University, Brno, CSSR

Cell Separator Testing Method Based on Measuring the Local Cross Section Electrical Resistance

V.V.Ionov, V.V.Isakevitch, Polytechnical Institute, Vladimir, USSR
E.E.Katalevsky, A.J.Chernokos, NPO "Polimersintez", Vladimir, USSR

SEALED LEAD-ACID BATTERIES. GAS RECOMBINATION

Evolution of Gas-Recombination Lead-Acid Cells and Batteries

R.F.Nelson, Gates Energy Products Inc., Warrensburg, Mi, USA

Lead-Acid Recombination Batteries. Principles and Applications

N.E.Bagshaw, Consultant, Stockport, England

Maintenance Free Motive Power Cells Using Gas Recombination Technology

J.M.Stevenson, F.Wilson, Chloride Industrial Batteries, Salford, England

Gas Recombining Batteries. From Basics to Batteries in Service

S.Warrell, Chloride Industrial Batteries, Salford, England

Improved Gelled-Electrolyte Lead-Acid Batteries for Deep-Discharge Applications

J.Strebe, B.Reichman, B.Mahato, K.Bullock, Johnson Controls Inc., Milwaukee, WI, USA

Sealed Lead-Acid Batteries. Theory and Applications

H.Tuphorn, Accumulatorenfabrik Sonnenschein GmbH, Bodingen, FRG

Tungsten Carbide Electrodes for Gas Recombination in Lead-Acid Batteries

I.Nikolov, G.Papazov, V.Naidenov, T.Vitanov, D.Pavlov, Central Laboratory of Electrochemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria

Sealed Lead-Acid Battery with Recombination Electrodes

G.Papazov, I.Nikolov, M.Bojinov, D.Pavlov, T.Vitanov, Central Laboratory of Electrochemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria

Reference Electrode and Gassing Studies of Lead-Acid Charge/Discharge Processes

J.Magyar, R.F.Nelson, Gates Energy Products Inc., Warrensburg, Mi, USA

Some Problems of Sealed Lead-Acid Battery Development

I.A.Aguf, Accumulator Institute, Leningrad, USSR

Measures for Minimizing the Hydrogen Pressure in Sealed Lead-Acid Batteries

H.Dietz, H.Doering, J.Garche, K.Wiesener, Dresden University of Technology, Dresden, DDR

Improved Theoretical Approach to Sealed Cells Investigations. First Results

M.Maja, N.Penazzi, Politecnico di Torino, Torino, Italy

Oxygen Evolution Reaction on Lead Dioxide in Sulphuric Acid Solutions

M.Dimitrov, Central Laboratory of Electrochemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria

Relating Recombinant Mat Separator Performance to SLA Battery Performance

J.Q.Selsor, D.Crouch, Evanite Fiber Corp., Corvallis, Ore, USA

Conditions of Recombinant Lead-Acid Battery Performance

J.Kwasnik, T.Pukacka, M.Paszkiwicz, B.Szczesniak, Central Laboratory of Batteries and Cells, Poznan, Poland

Oxygen Cycle in Sealed Rechargeable Cells

J.Mrha, J.Jindra, M.Musilova, Heyrovsky Institute, Prague, CSSR

Polyaniline Coated Electrodes for Gas Recombination in Lead-Acid Batteries

S.Sarkar, I.Basumallick, DNES Battery Project, Santiniketan, India

High Performance Maintenance Free Lead-Acid Batteries

C.Boehle, R.Kiessling, HAGEN Batterie AG, Soest, FRG

Influence of Cobalt Ions on the Behaviour of Maintenance Free Lead Acid-Batteries

K.H.Christian, R.Ackermann, VEB Grubenlampen- und Akkumulatorenwerke Zwickau, DDR

TECHNOLOGY

Continuous Production of Starter Battery Plates from Pb-Ca-Sn Strip

G.Clerici, Magneti Marelli Battery R & D, Milan, Italy

Modern Plate Making Technology

J.McLane, Wirtz Manufacturing Co., Inc., Port Huron, Mich, USA

New Technology for Lead-Acid Battery Positive Plate Manufacture Based on 4PbO.PbSO₄ Pastes

D.Pavlov, N.Kapkov, Central Laboratory of Electro-chemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria

On New Achievements in the Field of Lead-Acid Battery Construction and Technology

V.N.Leonov, A.I.Rusin, Accumulator Institute, Leningrad, USSR

Improving the Curing of Lead-Acid Battery Plates

R.J.Hill, D.A.J.Rand, CSIRO Division of Mineral Products, Port Melbourne, Australia
M.McDonagh, Oldham Crompton Batteries Ltd., Newport, England

Theoretical and Practical Considerations on Formation

F.Steffens, Electrona Ltd., Boudry, Switzerland

Temperature-Controlled Formation with BA/FOS-500

M.Bungardt, Digatron Industrie Elektronik GmbH, Aachen, FRG

The Influence of Perchlorate Ions on the Electro-formation of Pasted Positive Plates in Lead-Acid Batteries

G.A.Mateescu, "Acumulatorul" Enterprise, Bucharest, Romania

Influence of Loading on Current Efficiency of PbO₂ Formation

L.Franke, K.Michael, A.Zimmer, M.Gelbke, Dresden University of Technology and VEB Berliner Akkumulatoren- und Elementenfabrik, DDR

The Energetic Coefficient in Lead-Acid Battery Positive Plates

C.V.D'Alkaine, M.A.Santanna Dos Santos, Grupo de Eletroquimica, DQ-UFSCar, Sao Carlos, Brazil
L.A.Avaca, E.M.Oliveira, Grupo de Eletroquimica, IFQSC/USP, Sao Carlos, Brazil

Influence of the Electrolyte Temperature and the Positive Plate Thickness on the Performance of a Lead-Acid Cell

N.F.Compagnone, Industrie Magneti Marelli S.r.l., Romano di Lombardia, Italy

Calcium Products for Battery Grid Production

S.E.Hluchan, Quigley/Pfizer Company Inc., New York, USA

Alloys for Current-Carrying Bases of Sealed Batteries

M.A.Dasoyan, G.V.Krivchenko, Accumulator Institute, Leningrad, USSR

A New Pb-Ca Alloy for Maintenance Free Lead-Acid Batteries

S.Z.Zhao, Y.D.Lu, Z.Y.Jiang, Changchun Institute of Applied Chemistry, Academia Sinica, Changchun, China

Effect of Some Elements on the Performance of Lead-Antimony Alloys for Lead-Acid Batteries

Z.Y.Jiang, Y.D. Lu, S.Z. Zhao, Changchun Institute of Applied Chemistry, Academia Sinica, Changchun, China

Development of Low-Maintenance Alloys

W.Gillian, Pasminco Metals Pty. Ltd., Melbourne, Australia

Advances in Manufacturing Systems for Positive Tubular Plates of Stationary/Traction Lead-Acid Batteries

W.E.Fetzer, Accumulatorenwerke HOPPECKE, Brilon, FRG

X-ray Diffraction Studies of Basic Lead Sulphates

J.K.Vilhunen, NESTE Oy, Corporate R & D, Porvoo, Finland

Processes at Curing of Negative Lead-Acid Battery Plates

S.Ruevskij, D.Pavlov, Central Laboratory of Electro-chemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria

The Influence of the Separator and the Formation Electrolyte Purity on the Parameters of Maintenance-Free Lead-Acid Batteries

V.Koudelka, CERNY, AKUMA, Mlada Boleslav, CSSR

Production Technology of Lead-Acid Batteries with Positive Tubular Plates

J.Kwasnik, H.Krysiak, Central Laboratory of Batteries and Cells, Poznan, Poland

Some Scientific Fundamentals of Lead-Acid Cells

A.I.Rusin, Accumulator Institute. Leningrad, USSR

Drying of Formed Negative Plates for Drycharged Traction Batteries

M.Marinov, "Energia" Battery Plant, Targovishte, Bulgaria

NEW APPLICATIONS

Lead-Acid Batteries in US Load Leveling Applications

D.S.Carr, ILZRO, Research Triangle Park, NC, USA

Operating the World's Largest Lead-Acid Battery Energy Storage System

G.D.Rodriguez, Southern California Edison Company, USA

D.I.Morris, Electric Power Research Institute, USA

W.C.Spindler, D.S.Carr, ILZRO, Research Triangle Park, USA

Lead-Acid Batteries in the Arctic Photovoltaic Systems

O.Ikkala, A.Nieminen, NESTE Oy, Corporate R & D, Porvoo, Finland

Improving the Performance of Lead-Acid Batteries in Stand-Alone Power Supply Systems

W.G.A.Baldsing, J.A.Hamilton, A.F.Hollenkamp, D.A.J.Rand, CSIRO Div. of Mineral Products, Port Melbourne, Vic., Australia

Improved Lead-Acid Batteries for Remote Area Power Supply Systems

D.W.H.Lambert, CBS Batteries Ltd., Skelmersdale. Lancs., England

Recent New Batteries and New Technologies on Lead-Acid Power Systems in Japan

A.Kozawa, The IBA Inc., Cleveland, Ohio, USA

About Ginatta Electrolytic Plant for Lead Production From Scrap Batteries

*M.Ginatta, M.C.Baudino, GINATTA S.p.A., Torino, Italy
M.Maja, N. Penazzi, Politecnico di Torino, Torino, Italy*

NEW LEAD POWER SYSTEMS

The Lead-Hydrogen Battery - A New Type of Sealed Battery

N.Y.Lyzlov, O.A.Burmistrov, Accumulator Institute, Leningrad, USSR

Structure and Properties of Electrochemically Active Thin PbO₂ Films for Reserve Batteries

S.Tabat, A.Nowacki, B.Szczesniak, Central Laboratory of Batteries and Cells, Poznan, Poland

EQUIPMENT

Barton Oxide Manufacturing Equipment

J.Dix, Linklater Corporation, Costa Mesa, Ca, USA

Automation and Rationalization of the Plate Stacking Process for SLI, Traction and Stationary Batteries

A.Schwetz, ELBAK Batteriewerke GmbH, Graz, Austria

Totally Automatic Element Manufacturing Process for Lead-Acid Battery Factories

H.Lindqvist, A-Tekniikka Oy, Helsinki, Finland

Automated System for Temperature Controlled Formation of Lead-Acid Batteries

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P.Rakin, Chemical Power Sources Institute, Belgrade, Yugoslavia*

Microprocessor Controlled Production Line High Rate Testing with Data Collection and S.P.C. Evaluation of Results

D.Brandt, Bitrode Corp., Fenton, Mo, USA

BATTERY TESTING

Microcomputer Assisted Testing System for Electro-chemical Batteries

P.Cristea, R.Tuduce, L.Campeanu, C.Mihai, Polytechnic Institute of Bucharest, Romania

MISCELLANEOUS

Fundamentals for Successful Cost Reduction

B.Szakacs, Battery Technologies International, Clemmons, USA

Marketing Forecast - the Indian Scene

A.Raychaudhuri, NICCO, India

Batteries, Delhi, India Battery Industry in Turkey

M.N.Turkeri, Elektrosan Ltd., Ankara, Turkey

Posters:

A Multifunction Battery Test Equipment

D.Tonchev, P.Andreev, Central Laboratory of Electro-chemical Power Sources, Bulgarian Academy of Sciences, Sofia, Bulgaria

On the Historical Development of the Lead-Acid Accumulator, Especially in Europe

J.Garche, Dresden University of Technology, Dresden, DDR