ABSTRACTS

(A) GENERAL

1. Studies on a few cell systems for aluminium single shot batteries—

P. L. Joseph, V. Balasubramanian and B. A. Shenoi (J. Electrochem. Soc. Japan, **35**, No. 1, 8, 1967). Aluminium anodes in suitable electrolytes, containing chloride ions and an acid like sulphamic and mercuric chloride, give high anode potentials which make them a good substitute for magnesium in single shot batteries. The discharge characteristics have been presented for cells containing several depolarizers, manganese dioxide giving a high voltage and current output. Three figures and 8 references.

2. Anodic characteristics of the doubly activated nickel plate electrode in the methanol fuel cell—

C. Iwakura, S. Iwanaga and H. Tamura (J. Electrochem. Soc. Japan, **35**, No. 1, 12, 1967). The various relations between the preparative conditions of the doubly activated nickel plate electrodes and their characteristics were investigated in alkaline solution by measuring current/time-potential curves for the anodic oxidation of methanol on these electrodes. Formic acid addition to the electrolyte of the fuel cell reduced the electrode performance. In the life tests performance did not fall much under 100 mA/cm^2 current density, but largely decreased at high values higher than 200 mA/cm^2. Twelve figures and 2 references.

3. Electroformed fuel cell electrode matrices—

R.A. Botosan and T. Katan (Electrochem. Tech., **5**, 315, 1967). Fuel cell electrodes can be made from electroformed metal-fibre matrices having high specific area, high specific conductivity and structural strength. Two tables, 8 figures and 15 references.

4. Studies of immersion batteries using seawater as electrolyte III. On the cupric sulfide as a cathode active material in seawater battery—

Y. Aoki and M. Hiroi (J. Electrochem. Soc. Japan, **35**, 70, 1967). Amongst various salts slightly soluble in sea-water the polarization characteristics of cupric sulphide seemed to be excellent to obtain an effective, durable and economical cathodic active material for use in reserve batters. The oxidizability of the sulphide greatly depends on the method of preparation. Two tables, 7 figures and 3 references.

5. Corrosion prevention by suitable design in practice—

K. A. Van Oeteren (Werkstoffe u. Korrosion, **18**, 506, 1967). In corrosion protection a decisive factor is the appropriate design. This has been discussed in detail, with the precautions to be taken.

6. Corrosion and heat transfer—a review—

T. K. Ross (British Corrosion J, **2**, 131, 1967). Review, with 5 figures and 44 references.

7. Men against corrosion—

(International Nickel, No. 1, 23, 1967). An account, with illustrations, of the corrosion problems being tackled at the Harbor Island corrosion laboratory of International Nickel in North Carolina, U.S.A.

8. Fundamental aspects of the development of corrosion proof alloys—

N. D. Tomashov (Werkstoffe u. Korrosion, **18**, 694, 1967). Basic aspects; possibilities of cathodic alloying which strengthens the influence of the cathodic process; effects of small additions—palladium, copper or rhenium to high-chromium steel, and of palladium to titanium or titanium-niobium alloys; conditions for passivation; 17 figures and 64 references.

9. Studies on inhibitors of aluminium in alkaline media. V, VI. The inhibitive effects of polycarbonic and o-hydroxyazobezene sulfonic acids—

K. Horiguchi, K. Tamura and Y. Hayakawa; I. Saito and Y. Hayakawa (J. Electrochem.

23. Electrodeposition of cobalt-zinc alloys from the pyrophosphate bath—

D. V. Subrahmanyam and T. L. Rama Char (Metalloberflache, **21,** 200, 1967). Detailed studies have established the operating conditions for obtaining satisfactory deposits of cobalt-zinc alloys containing 1-94 per cent cobalt, with a cathode efficiency of 5-96 per cent and current density up to 20 amp/dm^2. There were sudden changes in plate composition and cathode potential at low current densities due to the deposition of alloys of different phases as shown by x-ray studies: gamma, gamma plus beta and epsilon. Three tables, 13 figures and 32 references.

24. Electrodeposition of organic coatings—

J. W. Hagen, F. W. Orttung and S. W. Chow (Paint and Varnish Production, **57,** No. 4, 48, 1967); abstract in Battelle Tech. Review, **16,** No. 7, 208a, 1967. Satisfactory coating application depends on polymer composition, mechanical and chemical stability of the vehicle, pH, bath temperature, solids and pigmentation.

25. Observations and experiments on paint electrodeposition—

F. Beck, H. Pohlemann and H. Spoor (Farbe Lack, **73,** 298, 1967); abstract in Lead Abstracts, **7,** 105, 1967. The theoretical aspects of paint electrodeposition are surveyed, and the results of investigations on the deposition of polymers on various metals discussed. Cathodic deposition is influenced by hydroxyl ions, irrespective of the cathode material. Anodic deposition is dependent mainly on the generated protons, dissolved metal ions being possibly an additional factor. The relationship between the constitution of polymers and their deposition behaviour is examined.

26. Science for electroplaters 117, 118. Porosity—

(Metal Finishing, **65,** No. 7, 71; No. 8, 72; No. 9, 79; No. 10, 80, 1967). Corrosion, basis metal area, pores, surface-depth corrosion static potential; galvanic couples; corrosion resistance, anodic polarization, electrode potential, aging of chromium deposits, 2 tables and 7 references; pit corrosion, inclusions.

27. Electropolishing in organic electrolyte solutions—

I. A. Menzies, D. N. Bulgin and G. W. Marshall (Trans. Inst. Met. Finishing, **45,** pt. 3, 122, 1967). Details of studies of the electropolishing of a number of metals in 10 per cent sulphamic acid—formamide solutions are given. Five tables, 14 figures and 33 references.

28. Cobalt-cadmium alloy deposition from the sulphate bath—

R. P. Dambal and T. L. Rama Char (Metal Finishing, **65,** No. 8, 55, 1967). The sulphate-bath has been found to be satisfactory for the deposition of cobalt-cadmium alloys containing 4-71 per cent cadmium at a cathode efficiency of 53-100 per cent, up to 30 amp/dm^2. One table showing effect of variables on deposit composition, cathode efficiency and potential.

29. A critical survey of phosphating processes—

B. Sathyanandham and K. Balakrishnan (Metal Finishing, **65,** No. 8, 48, 1967). Survey with 1 table, 1 figure and 31 references.

30. Trouble shooting in plating on plastics—

W. P. Innes (Products Finishing, **31,** No. 11, 54, 1967). An up-to-date report on the current status of the processes for plating on plastics, with suggestions to solve the problems.

31. Investigation of reflectivity and structure of electrodeposited nickel during electrolysis—

A. T. Vagramyan and N. K. Baraboshkina (Plating, **54,** 930, 1967). Measurement of reflectivity and its study during electrolysis, brighteners, leveling additives, polarization-reflectivity-structure of deposit, determination of leveling and brightening properties of additives, effect of surface-active substances, leveling mechanism, distribution of metal on submicrorough surface of electrode during electrolysis, estimation of adhesion of deposits by light reflection method. One table, 20 figures and 33 references.

32. A new electrolyte for electrochemical machining 1. Developmental studies, 2. Nature of the electrolyte—

M. A. LaBoda and M. L. McMillan (Electrochem. Tech. **5,** 340, 346, 1967). Solutions of sodium chlorate were found to have excellent electrochemical machining capabilities. Potentiostatic techniques have been employed to determine the differences between the chlorate and the more common chloride are nitrate electrolytes. Two tables, 13 figures and 7 references; 1 table and 6 figures.

33. Electroforming thin shells for experimental studies—

R. L. Carlson, B. R. Snider and L. Burke (Materials Research and Standards, **7**, 183, 1967); digest in Products Finishing **31**, No. 12, 32, 1967. Studies on electroforming of thin shells on mandrels as a better way to make these shells for aircraft and missiles. Method of forming the shells and specialized testing techniques which have led to information on the properties of the electroformed metal.

34. Training courses in finishing—

(Products Finishing, **31**, No. 12, 166, 1967). A list of courses in electroplating and spray painting to be given in various cities in the U.S.A.

35. A survey of chromium deposition. Fluoride, fluoborate and fluosilicate baths—

N. V. Parthasaradhy (Metal Finishing, **65**, No. 9, 63; No. 10, 70, 1967). Baths with fluoride, fluosilicate and fluoborate, anions in fluoride baths, advantages and disadvantages of fluoride baths, types of anodes; 1 table on operating characteristics. Tank linings, baths, 4 tables on operating conditions.

36. Study of the electrodeposition of lead by the Faradaic impedance methods—

S. Haruyan (J. Electrochem. Soc. Japan, **35**, 62, 1967). The polarization characteristics of the lead electrode by various frequencies of a.c. were studied by using an a.c. bridge. Some important parameters for the electron transfer process have been calculated. Six figures and 6 references.

37. Solid particles incorporated in electrodeposits—

B. B. Fulford (Industrial Finishing, **19**, No. 231, 43, 1967). Introduction, particle type, dispersion methods, operating conditions, properties of coating, application.

38. Bright cadmium plating–

H. Geduld (Electroplating and Metal Finishing, **20**, 271, 1967). Hull cell studies on the effects of metallic impurities on cadmium plating from the cyanide bath—lead, antimony, arsenic, silver, mercury, tin, chromium, nickel, cobalt, zinc, copper, on the appearance, throwing power and covering power; 19 figures and 7 references.

39. Hard chromium plating in oil prospecting and the plastics industry—

S. Ramachandran, S. N. Venkatakrishniah and P. S. Parthasaradhy (Metal Finishing J. **13**, 303, 1967). Introduction, plating of cylinder liners and plastic die sets; 4 figures and 8 references.

40. Plating on difficult-to-plate materials—

I. Friedman (Plating, **54**, 1035, 1967). Commercially practical processing sequences that provide for reliable service by components and related hardware so plated are discussed: aluminium and copper alloys, molybdenum, niobium, steels, titanium; 4 references.

41. Some production plating problems and how they were solved. Part 13—

S. Heiman (Plating, **54**, 1049, 1967). Parkinson's laws, color anodizing, silver and bright nickel plating, chromate conversion coating.

42. Interdisciplines: key to progress—

C. L. Faust (Plating, **54**, 1054, 1967). Hothersall memorial lecture, Institute of Metal Finishing, 1967: alloying by diffusion, electrodeposition, electrochemical machining, electroforming, new techniques.

43. Electroformed composite materials—

G. A. Cooper (J. Materials Science, **2**, 409, 1967). Introduction, apparatus, growth profiles, applications of the techniques—silica/copper, tungsten/copper, niobium/zirconium/copper; 6 figures and 14 references.

44. Hard chromium: industry's answer to longevity is coming of age—

(Electro Metallurgy, No. 3, 3, 1967). Processes applications and production problems.

45. ECD meets industry's demand for supper tolerances—

(Electro Metallurgy, No. 3, 8, 1967). The main components of the electrochemical deburring system, advantages and savings, operation, future prospects.

46. A new plating shop for United Air Lines—

C. D. Simpson and L. E. Lancy (Products Finishing, **32**, No. 1, 48, 1967). Detailed description, with illustrations, of aircraft maintenance plating at the United Air Lines installation in the U.S.A.

47. Plating-bath additions to produce hard electrolytic copper—

L. Svatek and J. Vitek, British Patent 1,064, 769; abstract in Copper Abstracts, No. 7254, 1967. Electrodeposited copper up to 256 HV has been obtained from a conventional acid sulphate bath, with additions of pure ethanol, glacial acetic acid, concentrated sulphuric acid, gelatin and casein.

48. Electrodeposition of gold for high-reliability devices—

W. Alina and E. Buckley (Products Finishing, **32,** No. 2, 48, 1967). A discussion of RCA's development of a plating specification and process for the electrodeposition of high-reliability gold on components used in semiconductor devices. Reliability requirements, plating applications, thickness, test criteria, inspection, plating-solution, equipment, cylinders and procedures, thickness requirements. Three tables and 11 figures.

49. German patents on electro-organic chemistry to 1960—

S. Swann (Electrochem. Tech., **5,** 389, 1967).

50. Bibliography of electro-organic reactions in Chemical Abstracts (1963)—

S. Swann (Electrochem. Tech., **5,** 393, 1967).

51. Effect of modulated current on etching of tantalum—

V. Lakshminarasimhan, K. R. Narasimhan and B. A. Shenoi (J. Electrochem. Soc. Japan, **35,** No. 1, 18, 1967). Different wave forms of current were employed for the study of etching of tantalum in non-aqueous electrolytes. The etch ratio is maximum with single phase half-wave rectified current. The optimum water concentration in methanol extends over a wide range. The set up is not costly for commercial operation. Fourteen tables, 2 figures and 4 references.

52. Fabrication of computer memory stores by electrophoresis—

J. M. Andrews (Platinum Metals Review, **11** No. 3, 92, 1967). New technique for deposition of ferrites on to platinum wires. Two figures showing the approaches and an experimental 8 × 8 memory array made by this method.

53. The role of metallurgy in electrochemistry—

H. J. Read (J. Electrochem. Soc. **114,** 159c, 1967). Presidential address for the Electrochemical Society touching upon metallurgy in relation to batteries, corrosion, dielectrics and insulation, electrodeposition, electronics, electro-organic chemistry, electrothermics, industrial electrolysis and theoretical electrochemistry.

54. Substitute nickel-free austenitic stainless Steels—

B. R. Nijhawan and coworkers (J. Iron and Steel Inst., **205,** pt. 3, 292, 1967). A family of substitute chromium, manganese and nitrogen austenitic nickel-free stainless steels were developed. Physical characteristics, metallurgical and chemical properties—including corrosion resistance in different media, and work-hardening response were examined.

55. The development of chromium-base alloys for use at high temperatures—

J. A. Rogers and A.R.G. Brown (Methods and Materials, **1,** 246, 1967). Introduction, chromium-metal, processing of pure and alloyed chromium, development of chromium-base alloys, oxidation and nitridation. Six tables, 4 figures and 83 references.

56. Inert-gas welding of non-ferrous metals. Part 1.—

E. A. Taylor (Metallurgical Reviews, **12,** 109-122, 1967). Review: processes, 144 references.

57. High strength stainless steels—

R. Barker (Metallurgia, **76,** 49, 1967). Review: constitution, martensitic and austenitic steels; 7 tables, 14 figures and 19 references.

58. The electrochemical properties of molybdenum and tungsten—

E. F. Sperenskaya, V. E. Mertsalova and I. I. Kulev (Russian Chem. Reviews, No. 12, 892, 1966). Potentials of redox systems, composition and spectrophotometry of complex compounds, electrolysis of solutions, reduction with metals and amalgams, polarography. Eight tables and 312 references.

59. Research on the safety of nuclear power reactors—

D. L. Morrison (Battelle Tech. Review, **16,** No. 9, 3, 1967). Discussion of current research that provides information for advancing the safety of operating reactors: introduction,

safety programme, loss of coolant. Four figures and 7 references.

60. Inert gas welding of non-ferrous metals. Part 2. Materials—

E. A. Taylor (Metallurgical Reviews, **12**-116, p. 123, 1967). Review: aluminium and its alloys, beryllium, copper and copper-alloys, magnesium and its alloys, nickel, silver, titanium and its alloys, zirconium, refractory metals, lead and its alloys, zinc, uranium. Eight tables, 20 figures and 406 references.

61. Stainless steels and chemical process industries—

S. K. Mukherjee (J. Inst. Engineers, India, **48**, No. 2, pt. CH1, 1, 1967). Review of the different qualities of stainless steels and their field of applications, highlights of the guiding factors in selecting the suitable grade of material.

62. Prefinished metals—

(Materials in Design Engg., **65**, No. 3, 97, 1967). This manual summarizes the major types of prefinished metals, details their key properties and shows how to use them: pre-painted, preplated, textured and other metal coated metals, pre-anodized aluminium, plastic-metal laminates.

63. On some electrical properties of colloidal systems—

J. J. C. Oomen (Philips Research Reports Supplements, No. 4, 1-146, 1967). Introduction, impedance of silver-iodide electrodes, soap films in mercury, impedance-recording techniques; references at the end of each section.

64. Study of the preparation of lead powder by direct reduction of lead monoxide and lead dioxide—

P. V. V. Rao and H. V. K. Udupa (Trans. Indian Inst. Metals, **19**, 99, 1966). Experiments on electrolytic reduction in an alkaline electrolyte gave current efficiencies of about 98 per cent with lead dioxide. Particle size of the latter affected the reduction process as well as the particle size of the resulting metal powder. The reduction of the monoxide involves dissolution and electrodeposition, while with the dioxide the reduction occurs directly in the solid phase.

65. Electrochemistry in dimethyl sulphoxide—

J. N. Butler (J. Electroanal. Chem. Interfacial Electrochem, **14**, 89-116, 1967). The literature available at the beginning of 1966 on the electrochemistry of various ions, in dimethyl sulphoxide—an excellent solvent for inorganic and organic materials, is reviewed at length, and tables of physical properties, solubilities, conductance and polarographic as well as potentiometric data are given. The electrochemistry of zinc, cadmium and lead in dimethyl sulphoxide is surveyed. Three figures, 15 tables and extensive bibliography.

66. Electrochemical preparation of sodium iodate from iodine using graphite substrate lead dioxide anode—

M. S. Venkatachalapathy and coworkers (Electrochem. Tech., **5**, 399, 1967). Small-scale laboratory studies lead to the construction of a 250-ampere cell which was operated for regular production. Seven tables, 5 figures and 15 references.

67. Radiation chemistry in Japan—

Y. Tabata and K. Oshima (J. Electrochem. Soc. Japan, **35**, 55, 1967). Brief history, present status from the basic and applied points of view.

68. Chemistry of the new polymers—

W. Flavell and V. E. Yarsley (Chemistry in Britain, **3**, 375, 1967). Review of developments: introduction, polyimides, heteroaromatic polymers, ladder polymers and linear aromatic polymers; 11 figures and 57 references.

69. Plastics in perspective—

N. E. Orrok (Metal Progress, **92**, No. 4, 213, 1967). Plastics are replacing other non-metallics and metals in a wide range of applications. Here is a special report: autos-plastics inside and out, production rates a problem, plastics and applicances, similar stress strain relationships, computers too, fan shrouds and cans are problems.

70. Research and the future for the lead-acid battery—

A. R. Cook (Chem. Age of India, 18th Anniversary Issue, 912, 1967). Introduction, the electric vehicle, what's ahead.

71. The state of the chemical industry—

(Chem. Age of India, 18th Anniversary Issue, 869, 1967). 1967 Review of the Indian chemical industry, including statistics.

—T.L.R.