ABSTRACTS

1. **A high-rate, high-energy thermal battery system—**

S. M. Selis, J. P. Wondowski and R. F. Justus (J. Electrochem. Soc. **111**, 6, 1964). The cell system Ca/KCl-LiCl-AgCl-K, CrO_4/Ag has been built within rectangular silver containers which are also the positive electrodes and discharged at several constant currents. For a ± 10 per cent voltage tolerance, energy outputs of 3 to 8 watt-min/cm² have been obtained for the 2.1 to 13.4-min. rates respectively.

2. **Polarization studies of molten carbonate fuel cell electrodes—**

I. Trachtenberg (J. Electrochem. Soc., **111**, 110, 1964). Polarization measurements have been made on individual electrodes in operating molten carbonate fuel cells by using a third idling electrode. Hydrogen was supplied to the anode and an air-carbon dioxide mixture to the cathode. No activation polarization was observed at either electrode.

3. **Platinum metals in the fuel cell—**

H. G. Oswin (Platinum Metals Review, **8**, 42, 1964). Description of the use of the platinum group metals in cells fuelled by hydrogen/oxygen, ammonia, hydrazine and hydrocarbons. The kinetics of the electrochemical oxidation of hydrocarbons are examined, the mechanism of electrode poisoning is discussed, and the likely usage of platinum metals in fuel cell technology indicated. Eighteen references.

4. **Corrosion resistance of titanium—**

J. Monaghan (Corrosion Prevention and Control, **11**, No. 1, 16, 1964). Review with tables giving detailed data on resistance to simple chemical reagents, industrial liquors, liquid metals, and reducing acids with continuous anodic passivation. Ten references.

5. **Corrosion in civil engineering.2—**

M. S. Haque (Corrosion Prevention and Control, **11**, No. 1. 28, 1964). Preservation of pile foundations, corrosion in concrete; 5 references.

6. **Inhibition of corrosion of brass in acids by furfuraldehyde—**

Y. C. Shah and M. N. Desai (Indian J. Tech., **2**, 31, 1964). The efficiency of furfuraldehyde as an inhibitor of the corrosion of brasses in hydrochloric, sulphuric, nitric, phosphoric and acetic acids, has been investigated. Table gives effect of inhibitor concentration on the corrosion of 80-20, 60-40 and 59-41 brasses.

7. **Fundamental considerations of stress corrosion—**

M. C. Huffstutler (Corrosion, **19**, 423t, 1963). A detailed analytical treatment of the thermodynamic, structural, mechanical and chemical aspects of stress corrosion is given. The importance of the theoretical implications in the design of stress corrosion tests is indicated. Nine references.

8. **Corrosion control on a 720-mile pipeline in Eastern India—**

R. A. Lowe (Materials Protection, 3, No. 1, 48, 1964). Description of corrosion prevention methods used on a 720 mile pipeline constructed from crude oil fields in Upper Assam to refineries in Eastern India. Soil resistivities along the route measure from 1 thousand to over 1 million ohm-cm. Outlines cathodic protection and coating of the pipe, and explains importance of inspection of the protective system.

9. **Stray current electrolysis and cathodic protection—**

G. E. Lewis (Australasian Corrosion Engineering, **8**, No. 1, 9, 1964). Introduction, stray current electrolysis, electrical drainage, the situation in Melbourne, cathodic protection, conclusion.

10. **Cathodic protection of aluminium in acid medium—**

K. G. Sheth and T. L. Rama Char (Australasian Corrosion Engineering, **8**, No. 1, 17, 1964). The corrosion of aluminium and its alloys in hydrochloric acid solutions can be prevented by the impressed current cathodic protection method. The current required for complete protection will be less in the presence of suitable corrosion inhibitors in the acid. Four tables and 19 references.

11. **Effect of inhibitor cations upon aluminium corrosion 1. Chromate solutions—**

J. C. Cessna, H. M. Joseph and R. A. Powers (Corrosion, **20,** 1t, 1964). Electrochemical and weight loss measurements illustrate that the inhibition of aluminium corrosion by chromates is influenced by the concentration and type of inhibitor cations present. Chromates of periodic group 2 cations are generally more effective in neutral and alkaline solutions than those from group 1. Seven figures on galvanic corrosion current between aluminium and steel, capacity of polarized cathodes, polarization for aluminium-iron couple and resistance: 4 tables and 26 references.

12. **Development of the electrochemical theory of metallic corrosion—**

N. D. Tomashov (Corrosion ,**20,** 7t, 1964). Introduction, thermodynamics and kinetics of corrosion processes, mechanism and controlling factors, new applications of the electrochemical theory. Eight figures, 3 tables and 31 references.

13. **Cathodic protection of heat exchangers using once through circulating water systems—**

G. G. Page (Corrosion Prevention and Control, **11,** No. 2, 19, 1964). Introduction, theory, sacrificial anodes, protection of heat exchangers by sacrificial anodes and impressed current, associated electrical equipment, current allowances; 38 references.

14. **Corrosion of commercial aluminium in some organic acids—**

N. Subramanyan and M. Sundaram (Indian J. Tech., **2,** 64, 1964). The corrosion of 2S aluminium in acetic, butyric, lactic, tartaric, oxalic and citric acids, without and with sodium chloride, has been investigated. Polarization measurements have been made. The corrosive nature of the acids is related to their complex-forming capacity.

15. **The corrosion behaviour of inhibited engine coolants 1, 2—**

H. H. Collins (Corrosion Prevention and Control, **10,** No. 8, 25; No. 9, 25, 1963). Introduction, experimental procedure, distilled water, B. S. forumlations, commercial antifreeze, inhibited anti-freeze; water inhibited with triethanolamine phosphate, triethanolamine phosphate—sodium mercaptobenzthiazole, benzoate—nitrite, borax and soluble oil; discussion.

16. **Inhibiting the corrosion of aluminium—**

V. K. V. Unni and T. L. Rama Char (Corrosion Technology, **11,** No. 3, 35, 1964). n-Butylamine is a fairly satisfactory inhibitor for the corrosion of aluminium-manganese alloy in hydrochloric acid solutions. The dissolution of the metal is electrochemical in character. Polarizaion studies indicate that the corrosion process with this amine is under cathodic control.

17. **Wetting agents and inhibitors in hydrochloric acid solutions—**

E. M. Kampouris (Corrosion Prevention and Control, **11,** No. 3, 17. 1964). Results for mild steel with substances like hexamine, thiourea, sulphonates, glycol, ethers; 25 references.

18. **Industrial applications of aluminium as a galvanic anode—**

T. L. Rama Char and V. K. V. Unni (Chem. Age of India, **15,** 543, 1964). Aluminium holds promise as an anode in the construction of primary batteries, and has also found applications as a sacrificial anode in the prevention of the corrosion of steel. The use of aluminium in the fields of batteries and cathodic protection has been discussed with reference to principles and practice. Two tables and 36 references.

19. **Recent Australian developments in the prevention of marine fouling of ships—**

H.A. Laurie (Australasian Corrosion Engineering, **8,** No. 3, 9, 1964). Introduction, biological anti-fouling research, investigations of new paint systems, testing techniques, appraisal of the present position, future trends. Two figures and 22 references.

20. **Engineering applications of electrochemistry —7. Anodic finishes for wear resistance-**

W. J. Campbell (Metal Finishing J., **10,** 5, 1964). Hard anodizing—applications, hardness, specifying requirements, processes, limitations, finishing; 8 references.

21. **Use of co-deposited non-conducting materials to improve the corrosion resistance of nickel-chromium electrodeposits—**

J. M. Odekerken (Electroplating and Metal Finishing, **17,** 2, 1964). Improvement in the corrosion resistance of bright nickel-chromium plate by interposing a nickel flash between bright nickel and chromium plating. The latter is done by using a nickel plating solution containing discreet non-conducting particles which are co-deposited with nickel. This is the Nickel-Seal process which effects savings

in nickel consumption and doubles the output due to the ability to plate a thinner deposit without loss of corrosion protection. Table, 19 figures and 23 references.

22. **Anti-tarnish treatments for silver**—

W. Goldie (Electroplating and Metal Finishing, **17**, 13, 1964). Application of the results of chromate passivating treatments to the development of a satisfactory method of passivating silver using galvanic couples which is exceptionally cheap and very easy to control. The galvanic process was successful from the viewpoint of high corrosion resistance, low contact resistance and ease of soldering.

23. **Technical developments of 1963**—

N. Hall (Metal Finishing, **62**, No. 1, 48B, 1964). Review covering the metal finshing field: degreasing and cleaning, pickling and bright dipping, polishing, anodizing, metallic coatings, metallizing - electroforming - vapour coating, conversion films-corrosion prevention, testing and control, miscellaneous ; 388 references.

24. **Science for electroplaters 84. Chromium hardness 85, 86. chromium deposition** —

L. Serota (Metal Finishing, **62**, No. 1, 60; No. 2, 68; No. 3, 76, 1964). Plating temperature, scratch hardness tests; chromium deposition theory, film, trivalent chromium, chromium dichromate, atomic hydrogen, cathode film, chromium chromate, carbon cathode; basic sol, hydrogen reduction, radioactive chromium.

25. **Alternate finishes for cadmium**—

I. M. Weiss (Products Finishing, **28**, No. 4, 60, 1964). Discussion of tin, tin-zinc, nickel-chromium, bronze and zinc finishes, including applications and costs.

26. **Electrodeposited magnetic alloys for computer uses**—

Frietag and J. S. Mathias (Electroplating and Metal Finishing, **17**, 42, 1964). Introduction, properties of magnetic materials, electrodeposition parameters and their effects on magnetic properties, computer applications, magnetic film memories, peripheral storage systems, conclusion. Two tables, 11 figures and 8 references.

27. **Gas plating equipment**—

C. E. MacNeill (Metal Finishing, **62**, No. 2, 47, 1964). Introduction, general equipment, methods of heating, auxiliary and control equipment, the deposition bulb, flow coating equipment, vacuum coating, dip coating, fluidized bed coating. Two tables, 9 figures and 19 references.

28. **Anodized aluminium. Specification and quality control**—

F. C. Porter (Metal Finishing J., **10**, 65, 1964). Introduction, material, surface texture, thickness, sealing, corrosion tests, abrasion resistance, other tests; 10 references.

29. **Progress in electroplating: the pace accelarates**—

H. Silman (Industrial Finishing, **16**, No. 189, 32, 1964). Introduction, corrosion problems, causes of failure, dual nickel, the chromium factor, dual chromium, triple nickel deposits, satin nickel, the 'nickel-seal' process, plant developments.

30. **Iron-nickel-chromium baths. Deposition of stainless steel**—

L. Domnikov (Metal Finishing, **62**, No. 3, 61, 1964). Report of Russian work on the deposition of iron-nickel-chromium alloys, whose composition was very close to that of 18-9 steel, from sulphate bath. Four tables, 5 figures and 9 references.

31. **Crackless chromium plating with a.c.-d.c. combinations**—

R. Tomono (Products Finishing, **28**, No. 6, 44, 1964). By selecting a certain combination of alternating and direct currents, crack-free chromium can be produced. Four tables and 19 figures.

32. **20 Rules for better cyanide zinc plating**—

J. L. Jackson and R. O. Hull (Products Finishing, **28**, No. 6, 66, 1964). Zinc plating is economical and attractive. Following the 20 simple rules enumerated cuts the chance of reject-causing troubles and assures getting the best a zinc deposit has to offer. Four tables, 2 figures and 20 rules.

33. **Some observations on finishes for printed circuits**—

C. J. Thwaites (Metal Finishing J., **10**, 113, 1964). Foil-clad boards — plating after and before etching procedure; plated-up boards.

34. **Plating on tungsten**—

C. Marzano (Plating, **51**, 207, 1964). The pre-treatment consists of usual cleaning, acid pickling and anodic etching in alkali. Before the final plating a strike with chromium, copper,

iron or gold is given, with proper activaton procedures for the strike deposits.

35. **Faster nickel plating with sulfamate solutions**—

F. L. Siegrist (Metal Progress, 85, No. 3, 101, 1964). Bright and semibright sulphamate nickel plating is twice as fast as with sulphate and distributes the deposit more uniformity in deeply recessed areas. The conductivity is also higher, and this reduces the requirements for electricity and for bath cooling.

36. **Electrolytic refining of gold employing rotating cathode**—

B. A. Shenoi, S. Gopal and K. R. Narasimhan (J. Electrochem. Soc., Japan, 31, 42, 1963). In the refining of gold from chloride solutions it is possible to employ high apparent cathode current density and a high current concentration using a rotating cathode.

37. **Carbons and graphites — their production and use**—

M. C. Brockway (Battelle Technical Review, 13, No. 3, 3, 1964). The unusual properties of carbons and graphites make them important in nuclear, space and other applications. New types of such materials, with improved properties, and the processes for producing them are discussed here.

38. **Automatic are processes improve welding technology**—

H. W. Mishler (Battelle Technical Review, 13, No. 3, 9, 1964). Automatic processes can produce welds of a higher quality and at lower costs than manual welding. Factors important in automatic processes are discussed, and the directions of future welding developments of its type are suggested.

39. **Survey of recent electrochemical research in Japan**—

W. Sakai (J. Electrochem. Soc., 31, 1, 1963).

—T.L.R.