NEWS SECTION

SOCIETY REPORT

New Members

Members:

S. S. Wagle, K. C. Shah, R. S. Shanbag, J. Sundararajan, S. Sathyanarayana, S. Panchapakesan.

Associate Members:

V. N. Kamath, K. J. Damodar, C. K. Mittal, P. K. Som.

Personals:

B. K. Balasubramaniam is on a foreign tour to study the latest developments in the battery industry.

T. L. Rama Char has been promoted as Associate Professor (Electrochemistry) in the Indian Institute of Science, Bangalore.

J. Sundararajan has left the C.S.I.R. and joined Grauer and Weil (India) Ltd., Bombay.

Matter for the Journal:

This issue of the Journal contains Special Abstracts on Batteries and Fuel Cells. Similar abstracts covering other branches of electrochemistry will be published in the future. The Journal will be glad to publish review articles of a theoretical or applied nature, and also short research communications. Suggestions for improvement are welcome.

GENERAL NOTES

Corrosion Costs

Recent estimates on annual cost in pounds million of corrosion control in some countries are: U.K. 195, Australia 146, Canada, 112, India 37 and U.S.A. 3,000. The world costs work out to about 15 billion pounds yearly. —Corrosion Technology, Vol. 11, No. 4, 9, 1964.

Corrosion in Aerospace

Five papers related to aerospace industry corrosion problems have been published in the April 1964 issue of Materials Protection: (1) Army missile Command: "stop that corrosion!", (2) Some corrosion problems on the F-101 Voodoo aircraft and the Bomarc and Minuteman missiles, (3) Corrosion of missile components, (4) Corrosion control on the Saturn S-11 and (5) Conversion coatings for aluminium and magnesium for missiles and space vehicles.

Duplex Nickel

An interesting piece of development work at the VEB Galvanotechnik, Leipzig, East Germany, has been directed to a method of obtaining a double layer nickel deposit from a single nickel solution. This is achieved by altering the current form in plating from a fully bright nickel bath. In the first stage, the plating process is carried out using D.C with superimposed A.C.; this deposits the first coating. To deposit the normal fully bright coating, the A.C. is then turned off and the current density is suddenly and sharply increased to avoid epitaxial growth on the first coating. This method appears to deposit something like the normal type of double nickel, in which the first coating contains less sulphur and has a different structure from the top coating. The importance of this work appears to be more in terms of increased understanding of the effects of current modification on the composition, structure and properties of electrodeposits. — Electroplating and Metal Finishing, Vol. 17, 167, 1964.

Meetings of the ECS of Japan

The Electrochemical Society of Japan held its 31st Annual Meeting at the University of Kyushu, Fukuoka from April 25 to 28, 1964. The sessions covered: battery, theoretical electrochemistry, electronics and materials for electrical industry, fuel cell, corrosion and anticorrosion, applied physical chemistry, electrodeposition and surface treatment, electroanalysis, organic electrochemistry, industrial electrolysis, extractive metallurgy, high temperature chemistry and fused salts. The JECS of Japan, Vol. 31, 3, 1963 has published the titles of the 109 papers contributed.

ECS Meeting in Toronto

Toronto was the venue of the May 1964 meeting of the Electrochemical Society. Technical sessions were divided into: electronics-luminescence and semi-conductors, electro-

thermics and metallurgy, theoretical electrochemistry, electric insulation and industrial electrolytic. The programme included an International Conference on Electron and Ion Beam Science and Technology jointly with the Metallurgical Society of the AIME. The March 1964 issue of JECS contains abstracts of the 222 papers.

Engineering Education

As the pace of modern technology quickens, there is developing in engineering education a strong pull between the demand for men equipped for careers in research, design, development or teaching and for those adept in application, construction, production or management. It becomes apparent that engineering curricula must be developed to provide satisfactory education for participants in book areas of activity. The Dean of Engineering, University of Florida has recently made a thoughtful and profound appraisal of the situation as it exists today and as it may unfold tomorrow—Florida Engineering News, Vol.6, April 1964.

AES Annual Convention

The American Electroplaters' Society held its 51st annual convention at St. Louis, Missouri from June 15 to 18, 1964. Twentyfour papers were presented in 6 technical sessions and covered various topics: automation, single metals and alloys, rectifiers, properties of deposits, cleaning, anodizing and electroforming. Abstracts of the papers can be found in the May 1964 issue of Plating.

Gordon Research Conferences

The Gordon Research Conferences for 1964 will be held from June 15 to September 4 in New London, N. H., U.S.A. The programme had been divided under physical metallurgy and corrosion. Titles of the 34 papers to be discussed have been published in JECS, May 1964.

Sixth International Metal Finishing Conference

London was the venue of the Sixth International Metal Finishing Conference, May 25 to 29, 1964. Authors from Brazil, France, Hungary, India, Italy, Japan, U.K., U.S.A., U.S.S.R. and West Germany contributed 42 papers in the following sessions: decorative chromium plating, plating equipment, electrodeposition research, development of coating processes, research on coating processes, corrosion prevention, plant and application methods, anodizing, research and properties of organic coatings, mechanical properties and engineering applications of electrodeposits, process and development in organic finishing. The programme included special lectures. The titles of the papers and other information concerning the Conference have been published in the Transactions of the Institute of Metal Finishing, Vol. 41, part 2, International Conference Issue, 1964. Some of the papers have been published in the Transactions, and the proceedings will be published separately.

Two papers were presented from India at this Conference: (1) A method of measuring hydrogen permeability of metals and its application to metal finishing, by M.A.V. Devanathan and S. Venkatesan (Karaikudi) and (2) Electrodeposition of iron alloys from the sulphamate bath, by S. S. Misra and T. L. Rama Char (Bangalore.)

Power Where You Need It with Nickel-Cadmium Accumulators

One of the main uses of nickel-alkaline accumulators has always been as a stand-by power source for lighting. In the event of a failure of the mains supply, these batteries can be switched in automatically and even after long periods of idleness they can be relied upon to function every time. Hospitals, factories, theatres, banks and stores rely on this source of emergency power. A recent article in Inco-Mond Magazine, No. 24, 1964 illustrates the uses of the batteries in communications statellite, rocket engine testing, transport of all kinds from the modern jet air liner to the tramcar.

There is little doubt that the nickel-cadmium accumulator is now the most versatile independent power source in existence, with a scope ranging from the provision of emergency supplies on an ocean liner to providing power for the minutest of modern instruments, from outer space to the domestic fireside. There is no telling how much further it will evolve. But certainly it will not be superseded for many years.

Sea Horse Institute Meetings

The annual discussion meetings of the Sea Horse Institute were held from June 1 to 4, 1964 at Wrightsville Beach, N.C., U.S.A. The topics included cathodic protection, metals and alloys, coatings and miscellaneous.

Third Industrial Finishes Exhibition

'Corrosion Prevention and Control' sponsored the Third Industrial Finishes Exhibition

in London during May 1964. The great technological and economic progress made by the finishing industry since the first event in 1961 is demonstrated by the fact that this exhibition was held only one year after the highly-successful 1963 Exhibition. The 1963 show was arranged simultaneously with the Sixth International Metal Finishing Conference. The May 1964 issue of Corrosion Prevention and Control gives a summary of the exhibits together with details of some striking recent developments in finishing technology: electrophoresis, multi-process finishing, electrostatic painting, containers for finishing, finishing pretreatment, gold finishing for transistors.

Recent Trends in Plating

Plating has now come abreast with the rate of development of other production engineering processes. One such advance is in the electroless copper plating field and it is believed that it will soon be economic to plate a finished copper printed circuit by this means on to a thin, cheap, plastic film, so producing the circuit in less time with fewer operations and using cheaper raw materials. The paper also discusses precious metal plating of electrical contacts, with comments on silver/rhodium, palladium and hard acid gold.—Products Finishing, Vol.17, 58, 1964.

The Future of Tin

Tin has stood the test of ages but is a relatively scarce commodity and also expensive. In electro-coating the metallic lustre for which tin is so well known is now being achieved with nickel coatings. But will nickel foil ever be used to preserve our chocolates and confectionery from factory to mouth? If so it will take a long time to educate a conservative population that nickel tastes better than tin. In tin cans for foods the problem is one of corrosion resistance. Is it not possible to have tin-coated aluminium cans or just lacquered aluminium cans which would enable tin to be dispensed with altogether? At the present time, however, there are good business prospects in the salvaging of tin from waste tin plate.—Corrosion Prevention and Control, Vol. 11, No. 5, 17, 1964.

Conference on Alloy Steels

The British Iron and Steel Research Association and the Iron and Steel Institute held a joint Conference on Metallurgical Development in High Alloy Steels at Scarborough during June 1964. The purpose of the Conference was: to present an up-to-date assessment of the main types of high-alloy steels in commercial use; to evaluate their properties to terms of user experience and to indicate future requirements so as to aid alloy steel development; to discuss the new materials currently being developed; to consider the progress made in understanding the metallurgical background of those alloys. Titles of the 20 papers contributed have been published in Corrosion Prevention and Control, May 1964.

Surface Science

The North-Holland Publishing Co., Amsterdam has started the publication of 'Surface Science' effective January 1964. It is an international journal devoted to the fundamental physics and chemistry of surfaces.

Air-conditioning

'Engineers' Appraisal of Air Conditioning for Schools' is the title of the Proceedings of the 13th Annual Air-Conditioning Conference held at the University of Florida in February 1964. This has been published in 'Engineering Progress at the University of Florida', Vol. 18, No. 5, 1964 and contains the following papers: (1) School air-conditioning system-selection and design, (2) Use of the heat pump for school air-conditioning, (3) Climate-controlled schools, (4) Odor-control in air-conditioning, (5) Gas as an energy source for school air conditioning, and (6) Commercial electric power as an energy source for school.

New Process Electrodeposits Paint

Paint coatings formulated for application by electrodeposition are now ready for the production line, according to the Glidden Co., Cleveland, Ohio, U.S.A. The equipment is from the electroplater's shop, but the materials are strictly paint. The result is: a 'dip coat' of paint that faithfully follows contours; a way to paint complex shapes easily; a high-production method for eliminating corrosion in inaccessible areas. The June 1964 issue of Products Finishing presents a detailed report on the process-principles and application. Another article in the same issue briefly describes the application in the automotive and other fields.

The most striking advantage of this method is that any surface which will conduct electricity and can be wetted by the appropriate solutions will be electrocoated. It will paint areas that are almost impossible to coat on a production line in any other way. Savings in paint and

labour costs can be effected. Close control can be maintained. Despite the advantages, electrocoating is not the solution to all difficult metal coating problems. The obstacles in adapting the concepts and principles involved to a working production line are formidable. This limits serious consideration of its use to companies able to commit substantial engineering resources to developing basic equipment design and production procedures.

Metal Finishers Convention

The Annual Convention of the National Association of Metal Finishers, U.S.A. was held at St. Louis, Missouri during June 1964. Topics discussed were (1) Quality finishing, including nickel and chromium coatings, and alternatives for cadmium, and (2) Water pollution control.

New Low-Density Pure Nickel Powder

A recent announcement states that Sherritt Gordon Mines Ltd., Toronto, Canada has developed pure nickel powder with low apparent density, for such powder metallurgy applications as fabrication of porous nickel plaques for nickel-cadmium batteries and fuel cells and production of high-purity nickel strip. Sherritt 'G' grade nickel powders consist of loose dendritic agglomerates of 99.9 per cent pure nickel particles. Strong compacts with porosity approaching 90 per cent can be prepared from these powders by using gravity sintering or slurry application methods. The nickel powders are produced by the precipitation of nickel from solution at high temperature and pressure. The process can be modified to produce powder with specific particle size and shape. This makes it possible to produce sintered plaques with controlled pore size and even pore distribution.

Propane Fuel Cells

Scientists at Battelle Institute, Frankfurt, West Germany have worked out a system that may show the way to a propane fuel cell. It uses 3N sulphuric acid at 100 C and Raney platinum catalyst. It gives a stationery current density of 200 milliamperes per square centimeter in the electrochemical oxidation of ethane, propane, butane, ethylene and carbon monoxide and 100 for methane, and pentane. A propane fuel cell operating at 100 C and 0.5 V could give a current density of 100 milliamperes per square centimeter. A galvanostatic half-cell set-up is used in this work. Gaseous fuel flows through a porous electrode made from gold powder, and powdered Raney platinum-aluminium alloy. In the test work a constant current load is impressed on the test electrode and the potential recorded with a Luggin capillary. Purity of the gases was 99.5 per cent except for the technical grade propane (about 90 per cent). Conversion of hydrocarbon to carbon dioxide was measured by coulometric analysis. Chem. and Engg. News, Vol. 42, No. 20, 42, 1964.

Materials of Construction and Corrosion

The May 1964 issue of Chemical and Process Engineering has published the following articles of special interest to corrosion technologists: (1) Materials of construction—general survey, (2) Metallic corrosion-further chemical engineering aspects, (3) Some considerations on materials selection, (4) Protection of nickel-base alloys against thermal corrosion, (5) Material selection for nuclear fuel reprocessing plant and (6) High pressure plant-corrosion protection.

Fuel Cells

In a paper, with 32 references, on the present position of fuel cell development, O.K. Davtyan (Russian J. Phys. Chem., No.9, 1056, 1963) has reviewed the recent trends in this field with special reference to Russian work. He has stated that gaseous or liquid fuels have the best prospects, because coal is one of the most valuable raw materials for the chemical industry. Electro chemical energy may be regarded as a possible basis for future transport; eventually it may be expected to be associated with atomic power production and also with the solar and wind energy.

Salt and By-Products

A two-day Seminar on Salt and By-Products was organized during April 1964 by the Central Salt and Marine Chemicals Research Institute, Bhavnagar. Five technical Sessions covered 133 papers on (1) Salt engineering, (2) Salt of different grades, (3) Desalination of sea water, (4) Marine chemicals—potassium, magnesium and calcium, and (5) Analytical aspects and problems of salt and byproduct industries.

Thermoelectric Cathodic Protection

A relatively recent entry in the race for production against corrosion is the thermoelectric generator. It is now used fairly widely, though unobtrusively, usually for the protection of gas pipelines. A small fraction of the flowing gas is

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36. **Possibility of utilizing decomposition energy of sodium amalgam in a fuel cell—**

J. Przyluski and R. Batijawski (Prezemysl Chem., **42**, No. 11, 624, 1963; C.A., **60**, No. 5, 5069a, 1964). A liquid sodium amalgam electrode was constructed that operates at 20° with 0.25 per cent sodium content of amalgam and 920 amp./m². At 70° and 1300 amp/m² complete decomposition of amalgam resulted with 2N sodium hydroxide as electrolyte.

37. **New organic depolarizers—**

E. A. McElhill, et al. (Proc. Ann. Power Sources Conf., **17**, 145, 1963). Over 200 organic compounds containing various reducible groups were tested for depolarizer activity in a specially designed half-cell. As the reaction proceeds the loss of cond. of electrolyte or pore plugging of cathode by bulky products overshadows the structural advantages of individual deplorizers.

38. **Mechanism of the processes in a silver electrode of a STS storage battery—**

V. N. Flerov (Zh. Prikl. Khim, **36**, No. 9, 1980, 1963; C.A., **60**, No. 5, 5069,g, 1964). The charge and discharge characteristics are evaluated and found to be a function of the anodic processes, the current density, temp., interruptions, the duration of storage before the beginning of discharge, and the number of cycles. The peculiarities of the Ag electrode were interpreted in terms of a solid-phase mechanism on the upper plateau and on the possibility of aging of the oxide phase.

39. **Action of separators on the migration of antimony in lead-batteries—**

F. Zehender et al. (Electrochim. Acta, **9**, No. 1, 55, 1964). In storage cells of practical design, a boundary region free of separators is put in parallel to the separators. When studying the effect of this boundary region it was found that it affects little the antimony migration in the case where mediocre or bad separators are used but that it limits the action of good separators..

40. **Fuel cells — a state of — the art — report—**

R. J. Jasinski, and T. G. Kirkland (Mech. Engg., **86**, No. 3, 51, 1964). In this article, a broad classification into hydrocarbon and non-hydrocarbon fuel cells is made. Under each head different varieties of fuel cells, are described and discussed. Further, regenerative and non-regenerative fuels are described, exemplifying each item.

—D. V. S.

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burned in the generator which produces an electric current sufficient to cathodically protect the pipeline. The cost of this current at present is about £ 9 per watt—Corrosion Technology, Vol. 11, 11, 1964.

Challenge in Materials Engineering

A report of a round table discussion in Metal Progress, June 1964 brings out forcibly the close relationship of materials selection to manufacturing processes. The metal-working properties of a material—its forming, machining, joining, heat treating and finishing characteristics—are of great concern to the materials engineer in this competitive age. Further, the great range of engineering components required today and the demand for higher strength materials in many applications present problems which can be solved only by integration of the materials selection and processing functions. The challenge is clear: today's materials engineer must make recommendations and decisions that are compatible with the objectives of the designer, yet which keep the practical aspects of producibility in mind.

—T. L. R.