NEWS SECTION

SOCIETY REPORT

New Members

Fellow P. M. Makadia.

Members S. K. Panikkar, R. S. Mani.

New Patron

Nickel Information Bureau (P) Ltd., Bombay-1.

Personals

T. L. Rama Char has been nominated as a member of the Committee on Cathodic Protection, Inhibition etc. of the C.S.I.R.

Meetings

A technical meeting was held on 16th December 1964 in Bombay. Mr. G. N. Flint, Assistant Superintendent, Development and Research Department, Research Laboratory, The International Nickel Co. (Mond) Ltd., Birmingham, U.K. gave a talk on "The Corrosion Resistance of Protective Metallic Coatings." Dr. S. N. Anant Narayan, Managing Director, Nickel Information Bureau Private Ltd., Bombay, presiding on the occasion, introduced the Speaker. He said that Mr. Flint has been associated with the International Nickel Co. (Mond) Ltd., for the past twelve years and has particular interest in the corrosion resistance of nickel-molybdenum and nickel-chromium systems.

Mr. Flint said that he would broadly classify the metallic coatings as anodic and cathodic with respect to the substrate and discuss the metallographic examination of the corroded area and electrical studies. Corrosion of nickel-chrominum coating on steel, the lecturer said, starts at pores in chromium coating. A corrosion cell between chromium which is cathodic and nickel which is anodic to steel is set up. In an examination of such a system after an exposure of about five years, chromium was found to be penetrated and the corrosion attack had gone down to the substrate-steel. Even with copper coating under nickel the galvanic current generated at chromium layer goes down to the basis layer. It is known now that the corrosion of nickel coating is not due to the pores in nickel coating. This has been demonstrated by bending a nickel-chromium coating of known thickness and exposing the finely cracked surface to corrosion tests when no corrosion was observed. In thinner nickel coatings, of course, porosity was important. Discussing the corrosion current flowing over plated metal surface, the mechanism of corrosion of nickel-chromium system was explained. Atmospheric corrosion is induced by visible drops of moisture which generates electrolytes in industrial areas. Speaking of his experience of overcoating nickel with noble metals like platinum, gold, rhodium and silver and measuring the cathode polarisation, Mr. Flint said, that his observation was that the noble metal coat had higher cathode potential. Chromium over nickel polarised rapidly indicating that as an overcoat for nickel, chromium was best. To prevent corrosion of nickel on steel, the cathodic coating should be improved by increasing the thickness. The corrosion should be stopped at the nickel layer and not allowed to penetrate to the substrate. Duplex and triple layers of nickel with chromium on the top also improved the corrosion resistance of steel. Micro-cracked chromium increased the cathodic potential and retards the penetration of the nickel layer on steel. The speaker exhibited a number of photomicrographs based on his work in the research laboratories.

Anodic type of metallic coatings like zinc is applied by hot dipping, metal spraying, sherardizing, electrodepositing and as pigment in paint. Whatever be the mode of application the protection given by zinc to steel is good. Speaking on the life of sprayed zinc coating on steel, he said that the time taken for 5% of the area to rust was about six years, the thickness of the zinc being 0·002 in. He discussed the rate of corrosion of zinc coating (2 oz/sq. ft.) in different atmospheres, rural, marine, industrial, room temperature and marine tropical. In galvanised iron, the spreading of corrosion is sideways. It was reported that electrodeposited iron and zinc alloy coating had great future. Though expensive, zinc coating had its own advantages — affords better protection in all types of atmospheres. Zinc has the peculiar property of showing reversible polarity under certain circumstances. Electrodeposited zinc is chromated to

improve the corrosion resistance of the coating. Cadmium coating is more advantageous in chloride atmosphere than zinc coating. Cadmium is anodic and corrodes preferentially. Comparing zinc and cadmium coating he said that cadmium was more suitable in marine conditions while zinc was more suitable in industrial atmosphere. With increased thickness, zinc is ideal for domestic uses like refrigerators, washing machines, etc.

Tin is usally applied to steel either by hot dipping or electrolytically. Electrodeposited tin is flow-melted to reduce the porosity. In most environments tin is cathodic to steel. In acid atmosphere tin is cathodic to steel. Tin is resistant to citric acid and hence its use in canning industry. Tin that dissolves initially acts as an inhibitor in the evolution of hydrogen. Whenever the coat of tin is thin, a coat of lacquer is applied to protect the surface. Aluminium is coated on steel by hot dipping or by spraying or by alpha process (electrophoresis). Though both the sprayed and electrophorised coatings are porous, the latter is less porous. As for corrosion resistance, discontinuous aluminium coating does not matter as in the case of zinc. Pores in aluminium coating are sealed by the corrosion product, i.e., aluminium oxide. Comparing the relative performances of aluminium, zinc and cadmium in industrial atmosphere, he said that aluminium coating had a life of nine years, while zinc had six years and cadmium only three years. A 50% mixture of aluminium and zinc spray followed by a coat of paint, gives best protection under all circumstances.

With an interesting discussion the meeting came to a close after a vote of thanks proposed by the Hon. Secretary to the speaker and to the authorities of the Indian Standards Institution.

GENERAL NOTES

Electrochemical Education and Training

It has been recently pointed out in the U.S.A. that there is only very limited opportunity for direct training in Electrochemistry or Electrochemical Engineering. Most institutions cover some aspects of these subjects as parts of other courses, but in a much limited way. The practical consequence is that much of the important subject matter of this field is overlooked, and there may be a complete neglect of the newer aspects. In the new edition of the "Chemical Engineering Handbook", for instance, the Electrochemistry discussion section was eliminated, and the Battery discussion completely re-written and included as part of Electrical Engineering. This treatment seems particularly unfortunate in view of the dynamic interest in Electrochemical Engineering currently being shown in Chemical Engineering departments. The lack of interest appears to be due to the lack of faculty members whose research and teaching interests are in this discipline.—J. Electrochem. Soc., Vol. 111, 144C, 1964.

Magnesium

The July 1964 issue of Journal of Metals has published the following papers of interest on magnesium production: (1) The production of magnesium and its alloys in the USSR, (2) Present status and future trends in the production of magnesium, (3) Thermic production methods for magnesium.

New Alloys for Extreme Conditions

Ni-O-Nel alloy 825 is a stabilized austenitic nickel-chromium alloy containing 19.5—23.5 chromium, 38-42 nickel, 2.5-3.5 molybdenum, 1.5-3.0 copper, 0.5 max. carbon and 0.6-1.2 per cent titanium; it possesses outstanding resistance to attack from a wide range of chemicals. The high chromium-nickel alloys containing 50 and 60 per cent chromium exhibit excellent resistance to fuel oil/ash corrosion, and an alloy with 35 per cent chromium is suitable for this purpose up to 800°C. The ductile 9 per cent weldable low-carbon nickel steel was developed to meet the demand for the transport and storage of liquefied gases. The maraging steels provide the engineer and designer with materials having the unusual combination of ultra-high strength and toughness combined with ease of fabrication. Simplicity of heat treatment is combined with outstanding mechanical properties, as for example, in the 18 per cent nickel-cobalt-molybdenum steel. In the USA, about 3,000 tons of these steels have already been manufactured, the initial attention being given to solid motor rocket cases, pressure vessels, landing gear components and ship plate.—Australian Chemical Engg., Vol. 5, No. 7, 17, 1964.

Indian Current Science Abstracts

INSDOC is publishing a new bibliographical periodical "Indian Current Science Abstracts" effective January 1965. This will replace the "Bibliography of Scientific Publications of South and South East Asia". The publication is intended to cover the entire scientific output of the country quickly and comprehensively.

New High-Strength Beryllium Alloy

A new grade of beryllium alloy with high stiffness/weight ratios has been developed. The strength-to-weight properties between room temperature and 1100F of the alloy are superior to those of steel or that of a titanium alloy. It is produced by powder metallurgy, but the grain size is finer than 12 u as compared to 35 for the existing alloy. Also the beryllium and beryllium oxide contents are respectively 92 and 4.5 per cent as against 98 and 2 per cent for the existing composition. The alloy is being considered for application in aeronautical space structures and in jet-engine components. Its high elastic limit makes it attractive to designers of critical guidance systems, pressure vessels etc.—Research and Industry, Vol. 9, 172, 1964.

Bronze Powder by Electrolysis

A method has been developed for producing bronze powder from waste bronze by electrolysis in a pyrophosphate-containing complexing solution. Thus it becomes possible to utilize cheap scrap material for the purpose of powder metallurgy. A bath containing, potassium pyrophosphate, ammonium citrate to increase anode corrosion, and potassium nitrate for conduction, was found to be the best, and gave a 90 per cent yield of electrolytic bronze. The bath contained tin in the tetravalent form, because the bivalent tin is oxidized with the simultaneous deposition of copper. Thus the electrochemical dynamism of tin is changed during the electrolysis of bronze.—Hungarian Technical Abstracts, Vol. 16, No. 2, 50, 1964.

Desalination by a Differential Redox Method

A method of differential desalination of electrolytes which utilizes electrochemical mass transport is described. Sodium chloride and/or bromide containing dissolved chlorine or bromine is electrolyzed between closely spaced parallel porous carbon electrodes with the electrolyte flowing through the pores of the electrodes to separate the electrolysis products. No membrane or barrier between the electrodes is used. Desalination takes place in the flowing anolyte stream and salt enrichment occurs in the flowing catholyte stream. Electrical energy requirements are low and indicate that near reversible behaviour is possible with bromine-bromide electrolytes. The method seems to be promising for further study for possible application in practical saline water conversion processes.—J. Electrochem. Soc., Vol. 111, 966, 1964.

ECS Meeting

Washington, D.C. was the venue of the technical meetings of the Electrochemical Society during October 1964. Sessions covered batteries, corrosion, electrodeposition, electronics and, electrothermics and metallurgy. The programme included symposia on fuel cells, corrosion products and processes, mechanisms of electrodeposition, liquid metal corrosion and electron microprobe. The August 1964 issue of JECS has published the abstracts of the 249 papers.

Stainless Steels

The recent trends and development in stainless steels have been focussed in the August 1964 issue of Metal Progress. Thirteen articles cover applications, heat treatment, forming, machining, welding, finishing and casting. It also contains a digest of recent literature, and data sheet on properties and applications.

IUPAC Congress in Moscow

The Twentieth International Congress on Pure and Applied Chemistry will be held in Moscow from July 12 to 18, 1965. The scientific programme will comprise six sections; physical chemistry of surface phenomena and disperse systems; radiation chemistry; cosmic chemistry; inorganic chemistry; analytical chemistry ; and principles of chemical technology. Some twenty invited lectures at plenary sessions and about 500 contributed papers will be presented.

Cadmium versus Zinc Plating

With cadmium costs going up many plating shops have converted to zinc plating as a substitute. The problems to be confronted in such a situation have peen discussed in the August 1964 issue of Products Finishing. The points covered are: difference in plating, cost, corrosion protection, application of chromate coatings.

Copper in Building

A Symposium on "Copper in Modern Building" was arranged by the Copper Development Association in London during September 1964. The papers presented were : (1) Prefabricated copper plumbing, (2) Progress in using copper for heating systems, (3) Surface finishes for copper and copper alloys, (4) Copper metals in contemporary European architecture, (5) Trends in using copper metals for building in the new world and (6) Copper in architecture and industrial design.

International Conference on Lead

The Second International Lead Conference will be held in Holland during October 1965 by the Lead Development Association on behalf of the European Lead Development Committee. Apart from special contributions on the background and economics of the lead industry, the following aspects will be covered in the technical sessions: cable sheathing, batteries and general applications.

Materials Technology and Testing

Scientific Surveys Ltd., London, the publishers of "Corrosion Prevention and Control" have started the quarterly publication 'Materials Technology and Testing' effective July 1964. This is being issued as part of the former Journal. It is devoted to the design, development and testing of all types of engineering and industrial materials. The first number, Vol. 1, No. 1 contains abstracts of 10 papers contributed to a Symposium on "Advances in Materials" held in 1964 in the U.K.

NACE Corrosion Reports

The August 1964 issue of Materials Protection has published 1963 corrosion reports covering Belgium and New Zealand.

Finishing Ways Merge: Electrophoretic Coatings

Electrodeposition is tending to become something of a hybrid process now-a-days in that some astonishing things are being plated. In Russia, strontium titanate has been electrophoretically deposited from a methyl alcohol solution to produce mechanically strong films of high dielectric constant after heat treatment. Another more unusual technique involves the use of electrodeposited bitumen coatings for oil-well casings, and this is interesting in view of the fact that there is no other practical way of doing this. Car bodies and the insides of petrol tanks are now being electrophoretically painted on a production scale with very good results. The trend looks like continuing, and we may well find in the future that the sharp line of demarcation between electroplating and organic finishing will become increasingly blurred. — Metal Finishing J. Vol. 10, 342, 1964.

Marine Corrosion Conference

A report of the 1964 International Conference on Marine Corrosion held in Cannes during July 1964 has been published in the September 1964 issue of Metal Finishing Journal. The topics discussed were: cathodic protection, organic coatings, zinc coatings, coating steel structures, paints for immersed surfaces, corrosion-resistant alloys, corrosion of aluminium alloys and brasses, and copper-nickel alloys.

ACHEMA Congress and Exhibition

A detailed report on the 14th ACHEMA Congress and Exhibition held in Frankfurt on the Main during June 1964 has been published in 'Chemical Age of India', October 1964. There are several papers of interest to electrochemists: (1) Alkaline chloride electrolysis plant with mercury cells—BASF/Lurgi process, (2) The production of large quantities of ozone, (3) Evaporating plant for solutions of basic materials and products of the chemical industry, (4) Plant for the continuous concentration of caustic alkali solutions, (5) Local conditions, a decisive factor for small-size electrolytic plants, (6) Producing chlorine and hydrogen from aqueous hydrochloric acid by the electrolytic process—Hoechst/Uhde and (7) Obtaining common salt from the sea.

OSU Research Review

The 'OSU Research Review' replaces the former publication 'Science and Appliance' issued by the Research Foundation of the Ohio State University. The first number, Vol. 1, has appeared in August 1964. The Review, which is more elaborate than its predecessor, will be published 9 times a year and will contain feature articles about research projects and other items.

Marine Paints Symposium

A Symposium on Marine Paints was arranged by the Research and Development Organization, Ministry of Defence at Bombay on Nov. 20 and 21, 1964. There were 4 technical sessions: protective coating — underwater/anticorrosive, miscellaneous; marine fouling-prevention; marine paints (general) and timber decay and its prevention.

Thermoelectric Generator

A lighter, more efficient thermoelectric generator for space satellites is the goal of a design study being considered by scientists at the Battelle Memorial Institute. This is expected to advance significantly the state of the art in the design of radioisotope-powered thermoelectric space generators. In such a generator, the heat from a radioisotope is converted into electrical energy by thermocouples — small solid-state devices which accomplish the conversion process

directly and without any moving parts. The electrical energy from generators of this type has been used to provide the power to operate the various sensitive and complex instruments packed into satellites. — Battelle Technical Review, Vol. 13, No. 9, 9, 1964.

Alpha Particle Generator

The operation of a generator which converts radioisotope energy directly into electrical power is being investigated in the U.S.A. The alpha-electric cell is intended to produce electrical energy in the one-million volt range and to convert it into usable forms. This cell has a prime advantage over conventional nuclear-powered electrical generators: it creates electrical power directly from a radioisotope without a heat cycle. The generator contains no moving parts and operates in a vacuum. It consists of (1) an emitter (cathode) coated with a thin layer of alpha-emitting material, (2) a collector (anode) to collect the positive alpha particles and build up a charge, and (3) a wise grid. The emitter, a tube coated with a fine layer of polonium—210, an isotope that gives off alpha particles, is located in the centre of the cylindrically shaped cell. The alpha particles are picked up and retained by the collector, which is the outer metal cylinder itself. The squirrel-cage grid is between the emitter and collector.—Battelle Technical Review, Vol. 13, No. 9, 9, 1964.

Chemistry in Britain

A joint monthly publication with the above title will replace the existing Journal of the Royal Institute of Chemistry and the Proceedings of the Chemical Society, London, effective January 1965. A wide range of articles on scientific, professional and industrial matters is planned, as well as news and announcements, book reviews, letters to the editor etc.

Chemical Communications

The Chemical Society, London will start the publication of a fortnightly Journal, 'Chemical Communications' from 1965. It is intended to be a forum for rapid publication of preliminary accounts of scientific research that is likely to prove of more general appeal or of urgent specialist interest.

Soviet Electrochemistry

This will be the title of a monthly cover-to-cover translation of 'Elektrokhimiya', a new Journal of the USSR Academy of Sciences scheduled for publication in January 1965. The translation will be carried out by the Consultants Bureau, New York with the co-operation of the Academy of Sciences Press and the Journal editors.

Chemical Engineering Congress

The Czechoslovak Scientific and Technical Society and the Czechoslovak Chemical Society of the Czechoslovak Academy of Science are holding the Second International Congress of Chemical Engineering, Equipment Design and Automation in Marienbad from September 12 to 19, 1965. There will be three main sections for the discussions: chemical engineering, chemical equipment design and automation.

Corrosion Conference in Australia

"Corrosion as a Surface Phenomenon" was the theme for the Fifth Annual Conference of the Australasian Corrosion Association held in November 1964 at New Castle, N.S.W. Technical sessions included surface protection, problems in non-ferrous corrosion, high temperature corrosion and corrosion testing. The papers have been reprinted in Australasian Corrosion Engineering.

Electrolytic Tin-plate in India

The first electrolytic tinning line in Asia will be set up at the Rourkela Steel Works by DEMAG of Germany. The plant will have an annual capacity of 150,000 tons of tin-plate. It is designed for a maximum strip width of 1·04 mm., strip gauges for 0·15-0·31 mm. and coil weights of maximum 15 tons. The electro-tinning line comprises a coil preparation line, where the coils leaving the finishing mill are trimmed and checked for faults and the tinning line working on the Ferrostan process. It also incorporates a tin-plate squaring line, arranged immediately behind the tinning line.—Science and Engineering, Vol. 17, 118, 1964.

— T.L.R