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ScienceDirect
Journal of Power Sources 158 (2006) 822–823
JOURNAL OF POWER SOURCES
www.elsevier.com/locate/jpowsour

Proclamation of the Gaston Planté Medal Committee

In 1860 the French scientist Gaston Planté presented to the members of the French Academy of Sciences a lecture "Nouvelle pile secondaire d'une grande puissance" – this was the birthday of the lead-acid battery. This year, the Lead-Acid Battery celebrates its 145th anniversary.

In 1989, in honor of Gaston Planté, the Presidency of the Bulgarian Academy of Sciences established a medal after his name to be awarded to distinguished scientists who have contributed greatly to the development of lead-acid batteries. An International Planté Medal Committee, comprising 15 scientists from 13 countries, was charged with the task to elect the Gaston Planté Medallists.

The recipients of the award are elected by a two-step procedure. First, all members of the International Advisory Committee, a total of 30 scientists and battery experts from all over the world, are asked to send their rating of the three most distinguished scientists who should compete for this award. The Organizing Committee summarizes all proposals and nominates the three highest ranked candidates for the Gaston Planté Medal Award. Then, the International Planté Medal Committee elects, by secret vote, the actual medallist.

The Organizing Committee of LABAT'2005 received proposals for 26 battery scientists and experts to be considered for nomination for the Gaston Planté award. The highest number of rating points gained:

(1) Dr. Masaharu Tsubota, GS Yuasa Corporation, Japan.
(2) Prof. Zen-Ichiro Takehara, Kyoto and Kansai Universities, Japan.
(3) Prof. Karel Micka, Technical University of Brno, Check Republic.
(4) Dr. Kenneth Peters, Consultant, UK.

Prof. Karel Micka and Dr. Kenneth Peters received equal number of rating points and shared the third place.

I want to point out that the nomination itself is a grant of honor and an acknowledgement of worldwide recognition for the nominees.

This year the members of the International Gaston Planté Committee gave the majority of votes to Prof. Zen-Ichiro Takehara. The president of the Bulgarian Academy of Sciences fully supported the decision of the International Planté Committee. So, I am pleased to announce that Prof. Takehara is the 2005 recipient of the Gaston Planté Medal.

On behalf of the Organizing Committee of Sixth LABAT Conference, I want to congratulate heartily Prof. Takehara on receipt of this prestigious award.

Prof. Zen-Ichiro Takehara

Prof. Zen-Ichiro Takehara was born in Okayama, Japan in 1932. His education and academic career are closely related with Kyoto University, Japan. He graduated this university with a bachelor degree in 1995, 2 years later he obtained his master degree there and in 1962 he became philosophy doctor in electrochemistry. In 1964 he was appointed Associate Professor and in 1983 Professor of Industrial Electrochemistry at the Faculty of Engineering. In 1966/1967 Prof. Takehara was a post doctoral research fellow under the supervision of Prof. Carl Wagner at Max-Planck-Institute für Physikalische Chemie, Göttingen, Germany. In 1994 he was elected as Director of the Environment Preservation Centre, Kyoto University until his retirement at the age of 63. After that, he was appointed professor at the private Kansai University and he continued his research and lecturing activities at this university, until 2003. Prof. Takehara is currently training under graduate and graduate students of Kansai University, as a part-time professor.

Professor Takehara is a distinguished organizer and supporter of the battery science and industry in Japan. He served as Chairman of the Battery Committee from 1987 till 1993 and he chaired the Society of Advanced Battery Technology and the Society of Fuel Cells in Osaka Science and Technology Centre from 1990 till 1996. He was planning the battery technology in Japan as Chairman of the Committee for Battery Development for Load-levelling and Automobile Use and as member of the Council of Industrial Technology at the Ministry of International Trade and Industry in 1990–2001. Through his membership in the above Committees and Councils, he contributed immensely to the development of the battery technology in Japan. He organized a number of International Conferences on Batteries, and chaired the Third International Meeting on Lithium Batteries in 1986, at Kyoto. He was president of the Electrochemical Society of Japan in 1995–1996.

0378-7753/$ – see front matter
doi:10.1016/j.jpowsour.2005.11.003

Professor Takehara has published 275 original papers, 80 reviews, 5 books, and has obtained 8 patents. All of them are widely cited in the international battery specialized literature. He has presented his work in a great number of plenary and invited lectures at numerous international conventions.

Prof. Takehara's research on lead-acid batteries is focused mainly on the mechanisms of the reactions taking place at the positive and negative plates during charge and discharge. Using ring-disk electrodes he has shown that these reactions proceed at reaction sites in the active material, via dissolution–precipitation mechanism. At high discharge current, Pb^{2+} ions dissolved in the electrolyte inside the pores of the active material may form colloidal particles. These particles are unstable and take part in the formation of $PbSO_4$ nuclei on the electrode surface. He established that the size of $PbSO_4$ crystals increases with decrease of the discharge current. During charge, anodic oxidation of $PbSO_4$ to β-PbO_2 and cathodic reduction of $PbSO_4$ to Pb proceed at the interface between $PbSO_4$ crystals and β-PbO_2 or Pb from the active materials. Thus, beside the exchange current densities of the electrode reactions, the crystal size, the solubility of $PbSO_4$ in sulphuric acid solution, the diffusion coefficient, and the length of the diffusion path of Pb^{2+} ions play important role in the charge process. These factors determine the inhomogeneous distribution of charge processes on the surface of the active material. Prof. Takehara established that the rate of oxidation of $PbSO_4$ to β-PbO_2 is determined by the charge-transfer process, while the reduction of $PbSO_4$ to Pb depends on the mass-transport process.

Prof. Takehara took an active part in a number of applied projects. He investigated the influence of floating charge voltage on the life of lead-acid batteries for the Japanese National Railways, the influence of resistance-reducing alloying additives and the role of Na^+ and Mg^{2+} ions in the electrolyte for high rate re-chargeability for Shin-Kobe Electric Co. Ltd., and many others.

Beside the lead-acid batteries research, Professor Takehara has worked in other battery fields as well. He did fundamental research on the mechanism of the charge–discharge processes in Leclanché elements, nickel cadmium and silver zinc batteries. He took part in the development of new batteries, such as nickel hydrogen and lithium ion batteries. Through his investigations, he clarified that the wettability of active materials with electrolyte, the increase of the three phase zone between active material, electrolyte and electron-conductive material, and the thin ion-conductive film, formed on the negative active material, are important for the production of batteries with high energy and power densities and long cycle life. He developed new electrolytes for lithium batteries, such as molten salt paste electrolyte with alumina and solid polymer electrolyte with liquid oligomer. These scientific findings have contributed greatly to the development of the battery industry in Japan.

Prof. Takehara has significant contribution to the development of high performance fuel cells, too. In this field he also focused his attention on the processes taking place at the three phase zone between the active material (hydrogen or oxygen), catalytic electrode and electrolyte. He also studied the diffusion process of ions through exchange membranes, solid oxides and paste molten carbonate. He studied the thermal phenomena during the above processes. Based on the results of the above research work, he defined the optimum design and created new electrode and electrolyte materials for various fuel cells applications.

Prof. Takehara has received a number of prestigious awards, including the Sano Award for youngest electrochemist in 1963; the Takei Award for the most excellent electrochemist in Japan in 1989, the Japan Chemical Society Award in 1993 and the Special Honorary Award from the Battery Committee of the Electrochemical Society of Japan in 2004. In 2000 the Japanese Government decorated him with the Order of the Violet Ribbon for the most excellent scientist in Japan for his research in the field of industrial electrochemistry.

On behalf of all members of the International Gaston Planté Medal Committee and the Presidency of the Bulgarian Academy of Sciences, I would like to congratulate Prof. Takehara for being elected the 2005 Gaston Planté medallist, and wish him good health and lots of success and creative energy in his future activities.

Prof. D. Pavlov (Chairman of LABAT'2005),
on behalf of the International
Gaston Plante Medal Committee

Available online 5 June 2006