



Prof. Tateo Usui

Doctor of Engineering

Emeritus Professor, Osaka University, Japan

Visiting Professor, Federal University of Ouro Preto, Brazil

Biography

Tateo Usui, 72, was educated at Osaka University, graduating from the Department of Metallurgy, in March, 1969. He subsequently graduated from the Graduate School of Engineering, Osaka University, Department of Metallurgy, in March, 1974 and obtained his Doctorate in Engineering from Osaka University at the same time.

He started his career as Assistant Professor from April, 1974, in the same laboratory chaired by (late) Prof. Munekazu Ohmi, Department of Metallurgy, Faculty of Engineering, Osaka University. After the retirement of Prof. Ohmi in March, 1986, the laboratory was chaired by (late) Prof. Zen-ichiro Morita (the 38th President of ISIJ from April 1990 till March 1992) in November, 1988. After the retirement of Prof. Morita in March, 1994, the same laboratory was chaired by Prof. Usui in November, 1995. After his retirement from Osaka University in March, 2010, the title of Emeritus Professor of Osaka University was given to Prof. Usui. He started his second career as full Professor, Department of Mechanical Engineering, Fukui University of Technology from April, 2010 till March, 2012. From April, 2012 till March, 2017, the title of Guest Professor in Joining and Welding Research Institute, Osaka University was given to Prof. Usui. He started his third career as Visiting Professor, Federal University of Ouro Preto, Brazil, from September, 2013 until now.

His research activities began in April, 1968, during his graduation thesis on Unsteady Flow Dynamics in Prof. Ohmi's laboratory, and he continued these topics in his Masters and Doctorate courses; in the meantime, he also started the topics on the rate enhancement of iron oxide reduction under pulsating flow. It is based on these research activities, that he was awarded his degree of Doctor of Engineering, Prize of JSME¹⁾ from JSME on "Theoretical Treatment of Pulsating Turbulent Pipe Flow" in April, 1977, and Nishiyama Commemorative Prize²⁾ from ISIJ on "Transport Phenomena and Reduction Rate Analysis of Iron Oxide Pellet" in April, 1986. His life's work and research activities of more than 50 years are summarized as follows:

- (1) Fluid Dynamics, Heat and Mass Transfer Analyses in and around a single particle, in a packed bed and a reactor
- (2) Reduction Behavior of Iron Ore Agglomerates (Pellets and Sinter) and Kinetic Analyses of their Reaction Rates
- (3) Experimental and Kinetic Analyses on Pre-reduction of Iron Oxide Pellets with Coal Carbonization Gas for Minimizing the Amounts of Coal Used in an In-bath Smelting Reduction Total Process
- (4) Basic Studies on Reduction of Carbon Composite Iron Oxide Pellets using Coke, Semi-char (from Coal), and Semi-charcoal (from Wood) in order to clarify the Rate Enhancement Effect of Residual Volatile Matter
- (5) Experimental Studies on Gas-Solid-Liquid Transport Phenomena in the Lower Part of a Blast Furnace by using Cold Models
- (6) Basic Studies on Impurity Concentration Control and Purification of Metals for Pig Iron Pre-treatment and Steelmaking Reactions
- (7) Experimental and Thermodynamical Studies on Environmental Problems, such as CO₂ Emission Control in Integrated Steelmaker and Dioxin Emission Control in Sinter Plants and Combustion Furnaces
- (8) Analysis and Control of Carburizing Reaction Rate as well as Basic Studies for Minimizing Hydrocarbon Volume in Carburizing Process of Steel

In addition to the two aforementioned prizes, he has also received:

- Gakujutsu Kouseki Prize (for distinguished services on Academic Activity) from ISIJ, on “Ironmaking and Steelmaking in Consideration of Resources and Environment” in March, 2006
- Best Paper Prize from High Temperature Society of Japan on “Dioxin Emission Control in Combustion Furnace,” in May, 2008
- The Poster Award for 17th IFHTSE Congress, 2008 from The Japan Society for Heat Treatment on “Relationship between Vacuum Carburizing Conditions and Surface Carbon Concentration of SNCM815,” in October, 2008
- Technical Paper Prize from JSEM on “Simple Removal Method of Dioxin from Exhaust Gases and Liquids,” in August, 2009
- Tanigawa – Harris Prize (for distinguished services on Academic Activity in High Temperature Metallurgy) from JIM on “Metals Processing mainly on Ironmaking and Steelmaking in Consideration of Resources and Environment,” in March, 2011
- Yamaoka Prize (for distinguished Group Research Activities) from ISIJ in
- Ironmaking Field, 6 times, in 1986, 1993, 1995, 2003, and 2013 as a member and in 2007 as the chairman
- Kusumoto Prize (for the Best Student in each Department) from Osaka University, in

March, 1969

- Osaka University Prize (for outstanding services on Academic Activity) from Osaka University, in January, 2007
- Nishiyama Medal from ISIJ on “Iron and Steel Processing in Consideration of Resources and Environment,” in March, 2019

His Distinguished Activities are as follows:

- (1) Chairman of Research Group in ISIJ on Iron Ore Sintering Process for Limonite Ore, twice, in 2000 – 2001 and 2001 – 2005
- (2) Chairman of ICSTI'06 (The 4th International Conference of Science and Technology on Ironmaking), in 2003 – 2007; organized by ISIJ, co-organized by Graduate School of Engineering, Osaka University and supported by The Ministry of Education, Culture, Sports, Science and Technology, Japan.
- (3) Chairman of the High Temperature Process Division in ISIJ, in 2005 – 2007; one of the typical activities was the symposium on “CO₂ Emission Control in Integrated Steelmaker (in Japanese).”
- (4) Chairman of ISISD 2010 (International Symposium on Ironmaking for Sustainable Development), 2009 - 2010; organized by ISIJ, co-organized by Graduate School of Engineering, Osaka University.

Prof. Usui is Advisory Board Member for “The Research and Development of Ironmaking Process Using Ferro-coke,” NEDO, Japan; Full Member of The Iron and Steel Institute of Japan (ISIJ); Full Member of The Japan Institute of Metals (JIM); Foreign Member of Association for Iron & Steel Technology, USA (AIST); Full Member of The Japan Society of Mechanical Engineers (JSME); Full Member of Smart Processing Society for Materials, Environment & Energy, Japan; Full Member of The Japanese Society for Experimental Mechanics (JSEM); and Full Member of Japan Society for Research Policy and Innovation Management.