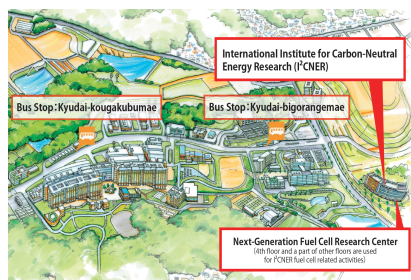


Workshop for Homeostatic Utilization of Energy

Date&Time : October 17, 2014
2:00 p.m.- 5:45 p.m.

Venue: I²CNER hall

For registration, please visit our website:
<http://i2cner.kyushu-u.ac.jp/>



Title Metallic Li Anode for High Power Density Battery

Speaker Prof. Kiyoshi Kanamura
Professor, Division of Applied Chemistry,
Faculty of Urban Environmental Science,
Tokyo Metropolitan University



Date & Time Friday, October 17, 2014 3:15 p.m.- 4:30 p.m.
Place I²CNER Hall, Ito campus, Kyushu University

Abstract

Lithium ion battery has been widely used in portable application. Recently, this battery has been also applied to power sources for electric vehicle and stationary application to store electric energy generated by solar cell and wind power. Lithium ion battery has much higher energy density than those of lead acid battery and Ni-hydrogen battery. However, new application, especially electric vehicle, needs more energy density than that of lithium ion battery. The energy density of lithium ion battery is limited when using the same anode and cathode. The solution is a utilization of new materials, such as Li metal anode, Si anode, Li-rich solid solution cathode, and so on. In this study, Li metal anode has been focused to realize higher energy density of rechargeable lithium battery. Li-metal has been investigated by many researchers, but has not been utilized to practical battery due to its low rechargeability and low safety. We have developed new type of polyimide separator with three dimensionally ordered macropore. Interestingly, this separator provides high rechargeability and high safety of Li metal anode.

About the Speaker

Prof. Kiyoshi Kanamura received his B.S. degree and Ph. D degree from Kyoto University in Japan (1987). During 1984-1998, he worked in Kyoto University as a research instructor and associate professor. He moved to Tokyo Metropolitan University as associate professor in 1998, continuing his research on electrochemical energy conversion systems. He became professor in 2002. He investigated various materials for lithium ion battery and fuel cell. Recently, he have developed new separator for lithium metal anode. By using this separator, high energy density battery (more than 300 W h kg⁻¹ laminated cell) has been realized. According to these efforts on battery and fuel cell regions, he has received several awards from Electrochemical Society Japan, Electrochemical Society Inc., and so on. He is now research director of ALCA project in Japan which is the biggest project on new generation batteries and includes more than 300 researchers from University and national laboratories.

Host: Professor Tatsumi Ishihara

Title Supercritical Route for Functional Nano Particles -New Materials, Waste Conversion, and Energy-

Speaker Prof. Tadafumi Adschiri
Professor, WPI-AIMR
Tohoku University



Date & Time Friday, October 17, 2014 2:05 p.m.-3:15 p.m.
Place I²CNER Hall, Ito campus, Kyushu University

Abstract

In this lecture, first, the specific features of supercritical water reactions are summarized with explaining some experimental results of biomass conversion, chemical recycle of waste plastics, organic synthesis, heavy oil conversion and nanoparticle synthesis. Commercialization of these processes is also introduced. Regarding nano particles, recent results on supercritical method will be explained. Organic modified nanoparticles (NPs) could be synthesized in supercritical water. The NPs show high affinity with the organic solvent or the polymer matrix, which leads to fabricate the organic inorganic hybrid nanomaterials with new functions. Supercritical method could control the exposed surface of NPs which gives rise to provide high catalytic activity, which can be used for gas cleaning up, heavy oil conversion and waste black liquor conversion. In this lecture, catalytic reaction with the NPs for low temperature heat recovery will also be introduced.

About the Speaker

Prof. Adschiri was graduated from the university of Tokyo in 1981 and has got the PhD degree there in 1986. After working as a special fellow of JSPS, he became an assistant professor in the University of Tokyo in 1987. Till then, his main research has been for new technology for energy. In 1989, he moved to Tohoku University, and started the study on reactions in supercritical fluids, including biomass conversion, chemical recycle of wastes, new organic reactions and materials synthesis. He is the inventor of supercritical hydrothermal synthesis for nanoparticles. For his excellent research, he was awarded with many prizes including the awards from the Chemical Society Japan, Chemical Engineering Society of Japan, Japan Energy Society, three minister's awards of MEXT (Ministry of Education, Culture, Sports, Science and Technology), and Japan Invention Award. He led a national project (30 million US dollars) in Japan, for Super Hybrid Nanomaterials, using supercritical water, and is now leading a big consortium (78 companies) based on the established nano fluid/soft ceramics technology.

Host: Professor Tatsumi Ishihara

Title Innovative Steelmaking System as Solution of Energy, Environment and Resource Problems

Speaker Prof. Tomohiro Akiyama
Director,
Center for Advanced Research of Energy and Materials
Faculty of Engineering, Hokkaido University



Date & Time Friday, October 17, 2014 4:30 p.m.-5:45 p.m.
Place I²CNER Hall, Ito campus, Kyushu University

Abstract

Nowadays, the steel demand is highly increasing to fulfill the human needs and industrial sector in the world. The dependence of steelmaking on fossil fuel and high grade resource causes serious three problems related with the energy, environment and resources. To solve the problems simultaneously, we proposed the advanced method based on Chemical Vapor Infiltration (CVI) process which utilized low grade resources and biomass. Using available exhaust heat, dehydration of low grade ore generated layer by layer porous structure which is highly useful for energy storage. The tar vapor, produced from pyrolysis of solid fuels such as low grade coal and biomass, infiltrated within porous ore in the form of amorphous carbon to produce iron/carbon composite. Interestingly, thanks to nano-scale contact and specific carbon type, the composite showed high reactivity with lower temperature in reduction reaction. In addition, the composite was pre-reduced to Fe₃O₄ due to simultaneous indirect reduction by gas product. Therefore, the proposed method offered highly essential benefits in steelmaking industry such as effective utilization of low grade resources, onsite carbon cycling and possible exhaust heat recovery. The new system of sintering plant with CVI one will be designed and discussed for solving the problems during the lecture.

About the Speaker

Prof. Tomohiro Akiyama received his B.S. and M.S. degree from Hokkaido University in 1983 and 1985, respectively, and received his Ph. D degree from Tohoku University in 1991. During 1985-1997, he worked in Tohoku University as an assistant professor and then lecturer. He moved to Miyagi National College of Technology as an associate professor in 1997 and worked at there until 2000. Then, He moved to Osaka Prefecture University as an associate professor and worked at there until 2004. After that, He moved to Center for Advanced Research of Energy and Materials, Faculty of Engineering, Hokkaido University as a professor. He is now the director of Center for Advanced Research of Energy and Materials, Faculty of Engineering, Hokkaido University.

Host: Professor Tatsumi Ishihara