Next generation rechargeable batteries

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Abstract

Rechargeable lead acid batteries were developed in 1859 and NiCd batteries in 1899. Since then, it took almost 100 years that nickel metal hydride batteries and lithium-ion batteries were commercialized. Among the four rechargeable batteries, lithium-ion batteries show the highest energy densities exceeding 250 Wh/kg and therefore, lithium-ion batteries have been used in the field of not only the portable devices but also hybrid electric vehicles (HEV), plug-in HEV and EV.

The energy densities of lithium-ion batteries will be limited by 300 Wh/kg unless the excellent positive electrodes are developed. Therefore, various rechargeable battery systems beyond lithium-ion batteries have been extensively studied in the world.

In this talk, I will summarize the candidates of post lithium-ion batteries such as batteries based on zinc negative electrode, multi-valent systems, and also anion shuttle batteries.

Brief bio of the speaker

Dr. Abe received his PhD degrees from Graduate School of Engineering, Kyoto University. Upon completion of his PhD degree in 1996, he joined Graduate School of Engineering, Kyoto University as a Research Associate in 1997 and was promoted to Associate in 2002 and then to Professor in 2009. His current research is based on lithium ion batteries in addition to the aqueous batteries based on zinc negative electrodes. He has to his credit about over peer-reviewed 250 papers and serves as an editor of Journal of Power Sources.