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Center for Integrated Bio and Nano Systems
SPEAKER SERIES

PRESENTS

Next Generation Rechargeable Lithium Batteries and Beyond

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Friday, Jan. 25, 10:30 am
CBB - 108
Pizza will be provided

LECTURE ABSTRACT

In order to enable 40 miles PHEVs and long electric drive range EVs, there is a need of developing advanced battery systems that offer at least 250 to 300 wh/kg energy density. The most significant technical barrier to developing commercially viable Plug-in Hybrid Electric Vehicles (PHEV) is the energy storage system. The challenge is to develop batteries that are able to perform the requirements imposed by a PHEV system and yet meet market expectations in terms of cost and life. In this case, the PHEV battery will experience both deep discharge, like an electric vehicle, and shallow cycling necessary to maintain the battery for power assist in charge sustaining HEV mode. Conventional lithium-ion batteries based on metal oxides and graphite have made significant progress in recent years for HEV applications, however, durability with the PHEV duty cycle and the ultimate cost and safety of the technology remain key challenges. To achieve a very high all electric drive range, a new battery system with advanced high capacity cathode materials and stabilized high capacity anode is needed. In this talk, we will disclose several strategies to increase significantly the energy density of lithium battery trough the development of high energy cathode material coupled with high voltage electrolyte. We also describe some new approach of improving the cycle life of Si/carbon composite anode and addressing the poor initial efficiency of this system by developing a novel prelithiation concept. We will conclude by showing novel Sulfur selenium based system that overcome both conductivity, swelling and dissolution issues known to sulfur system.

SPEAKER BIOSKETCH

Dr. Khalil Amine is an Argonne Distinguished Fellow and the director of the Advanced Battery Technology team at Argonne National Laboratory, where he is responsible for directing the research and development of advanced materials and battery systems for HEV, PHEV, EV, and satellite, military and medical applications. Dr. Amine currently serves a committee member of the U.S. National Research Consul, US Academy of Sciences on battery related technologies. He is an adjunct distinguished professor at Stanford University, Hong Kong University of science &Technology, Peking University, and Beijing Institute of Technology. Among his many awards, Dr. Khalil is a 2003 recipient of Scientific America's Top Worldwide 50 Researcher Award, a 2008 University of Chicago distinguished performance award, a 2009 recipient of the US Federal Laboratory Award for Excellence in Technology Transfer, 2013 DOE Vehicle technologies office award and is the five-time recipient of the R&D 100 Award, which is considered as the Oscar of technology and innovation. In addition, he was awarded the ECS battery technology award and the international battery association award. Dr. Amine holds over 198 patents and patent applications and has over 547 publications with a google h-index of 108. From 1998-2010, Dr. Amine was the most cited scientist in the world in the field of battery technology. He served as the president of IMLB. He is also the chair of the international automotive lithium battery

Institute of advanced studies.