

ENERGY AND MATERIALS RESEARCH

December 06-07, 2017 Dallas, USA

Carbon nanomaterials for advanced rechargeable batteries

Wonbong Choi

University of North Texas, USA

Next-generation energy storage devices, such as Li-ion batteries (LIBs) and Li-sulfur batteries (LiS), demand high energy, power and better safety. Conventional graphite anode falls short of fulfilling all these necessities. Carbon nanostructural materials (graphene and carbon nanotubes) have gained the spotlight as promising anode materials for energy storage; they exhibit unique physico-chemical properties such as large surface area, short Li^+ ion diffusion length, and high electrical conductivity, in addition to their long-term stability. Among all published literatures in Li-ion battery, nanostructured carbon materials occupy ~70%. Such an impressive figure signifies high interest and promising future of this class of materials in energy storage devices and compels us to consider the involved issues deeply. Carbon-nanostructured materials have issues with low areal and volumetric densities for the practical applications in electric vehicles, portable electronics, and power grid systems, which demand higher energy and power densities. One approach to overcoming these issues is to design and apply a three-dimensional (3D) electrode accommodating a larger loading amount of active anode materials while facilitating Li^+ ion diffusion. Furthermore, 3D nanocarbon frameworks can impart a conducting pathway and structural buffer to high-capacity non-carbon nanomaterials, which results in enhanced Li^+ ion storage capacity. In this presentation, the current status of the design and fabrication of 3D carbon nanostructures will be reviewed. Our recent progress on 3D carbon nanomaterials for LIBs and Li-S batteries will be presented. Finally, the superior performance of 3D carbon nanotube-sulfur will be presented along with its mechanistic analysis.

Biography

Wonbong Choi is a tenured, Full Professor in the Department of Materials Science and Engineering and Mechanical and Energy Engineering at University of North Texas, Denton. He has obtained his PhD in Materials Science and Engineering from the North Carolina State University (NCSU) in 1997. After his PhD, he has worked in the industry research laboratory as a Senior Researcher and Project Manager at Samsung (SAIT). He was a Leading Scientist in the carbon nanotubes for Tera-level nano electronics device project. He has been awarded the prestigious Materials Research Society (MRS) Medal for 2006. He has awarded MRS Fellow in 2009. He has successfully conducted numerous granted projects funded by AFOSR, DARPA, NSF, SRC, DOE and Samsung. He is the author/co-author of over 80 patents, one book ("GRAPHENE" CRC Press 2011), 10 book chapters, over 240 publications, which includes 140 peer-reviewed journal articles and over 70 conference proceedings. His research articles have been cited over 10,000 times with H-index of 51 (Google Scholar). He serves as a reviewer for more than 20 international journals and serves on the Editorial Board of five journals.

Wonbong.Choi@unt.edu

Notes: