**Title: Designing Nanostructured Electrodes and Electrolytes for High-Performance Energy Storage Devices**

Electrochemical energy storage systems are the key enabling technologies to support fast-growing consumer electronics and electric vehicles. Cost-effective and high-performance electrochemical energy storage device can increase the fuel efficiency of new transportation technologies, including start-stop vehicles, (plug-in) hybrid electric vehicles, all-electric vehicles, and heavy machinery, which can significantly reduce energy imports and greenhouse gases. Moreover, reliable large-scale energy storage technologies are particularly attractive for renewable energy storage owing to their high efficiency, short charge/discharge time, and long cycle life. Aiming towards such advanced technologies, Dr. Lee’s research pays particular attention to harnessing electrochemical reactions of electrode materials and their scalable synthetic routes. The following strategy has been applied in Dr. Lee’s research: 1) understanding the bulk and surface, atomic and electronic structures of electrode and electrolyte materials, 2) correlating these electrodes’ structures with electrochemical properties, and 3) designing novel electrode and electrolyte materials using various nano-processing techniques. In this seminar, we will discuss 1) how redox-active carbon materials can enhance the energy and power densities for rechargeable batteries, 2) how to assemble 3D nanostructured electrodes using self-assembly process for high-performance energy storage devices, and 3) how 3D nanostructured electrolytes can enable stable operation of solid-state lithium metal batteries.

**Bio:** Dr. Seung Woo Lee is an Associate Professor of the Woodruff School of Mechanical Engineering at Georgia Institute of Technology. Dr. Lee received his B.S. in Chemical Engineering from Seoul National University with Summa cum laude in 2004 and Ph.D. in Chemical Engineering from Massachusetts Institute of Technology in 2010. He joined the Woodruff School of Mechanical Engineering at Georgia Institute of Technology in 2013. Dr. Lee is an expert of electrochemical energy storage and conversion systems, which are the key enabling technologies to support fast-evolving consumer electronics and electric vehicles. Dr. Lee has published more than 95 articles in peer-reviewed journals with very high citations, showing the broad impact of this research on the research community of electrochemical systems. In particular, he has developed high-performance nanostructured electrodes using the surface redox reactions for advanced rechargeable batteries and supercapacitors. His work has been published in Nature Nanotechnology, Nature Communications, Energy & Environmental Science, and featured in many public news articles. Dr. Lee is the recipient of the Sigma Xi Young Faculty Award (2019), the NASA Early Career Faculty Award (2018), the NSF CAREER award (2018), the Samsung Global Research Outreach Award (2014 and 2018), the Hanwha Advanced Materials Non-Tenure Faculty Award (2016), and the Korean-American Scientists and Engineers Association (KSEA) Young Investigator Grant Award (2016).