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# 14th International Green Energy Conference

(IGEC-XIV)

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Name	Huizhi Wang	
Affiliation	Imperial College London	
<b>Invited Keynote Lecture</b>		
Presentation Title	<b>Next-generation lithium-ion batteries and beyond</b>	
Abstract (Approximately 200 words)	<p>Lithium-ion batteries (LIBs) are currently the dominant energy storage technology for consumer electronics, and they are expanding their applications to automobiles and stationary storage. The rapid expansion in LIB applications requires continuous improvements in energy density, power density, lifespan and safety, which has spurred research into novel LIB chemistries and even "beyond lithium" chemistries. One next-generation LIB solution that has been attracting considerable attention is to replace graphite anodes with silicon-based electrodes. In contrast to the intercalation carbonaceous materials, silicon is an alloying electrode material and thus can provide a theoretical capacity ten times higher than that of graphite. Silicon has unique electrochemical behaviors with a huge voltage hysteresis between the charge and discharge voltage curves. In this talk, we will first present a mechanistic study to reveal the origin of the path-dependent voltage hysteresis of silicon at different lithiation depth. We will next discuss the role of silicon in a silicon/graphite composite electrode using a multi-material electrochemical model. A dimensionless factor will be introduced to indicate the active regions of silicon and graphite materials and we will demonstrate how it can be used to design cycling protocols for mitigating degradation of silicon/graphite electrodes. Some of our recent efforts in going beyond lithium will also be covered in this talk.</p>	
Biographical Sketch (Approximately 200 words)	<p>Dr Huizhi Wang is a Senior Lecturer (Associate Professor) in the Department of Mechanical Engineering at Imperial College London, United Kingdom. She received her Ph.D. degree in Mechanical Engineering from the University of Hong Kong. Prior to joining Imperial College London, she was an Assistant Professor in the School of Engineering and Physical Sciences at Heriot-Watt University, Edinburgh. Her research centers on electrochemical engineering with activities including design, manufacturing, characterization, and modeling of electrochemical energy devices such as fuel cells, batteries and electrolyzers. She has (co)authored over 100 articles in peer reviewed journals and several book chapters and patents.</p>	