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Name	Jianbo Zhang	
Affiliation	Tsinghua University	
Invited Plenary Lecture		
Presentation Title	Startup of Fuel Cells and Lithium-ion Batteries from Low Temperatures	
Abstract (Approximately 200 words)	<p>Vehicle electrification is gaining momentum for its contribution to the city air quality and its potential to promote the use of green energy. However, the diffusion of pure electric vehicle, i.e. battery electric vehicle (BEV) and fuel cell electric vehicle (FCEV), in the high-altitude area, is hindered by the limited performance and exacerbated degradation of lithium-ion batteries (LIB) and fuel cells (FC) at low temperatures. In this lecture, various materials and operation strategies to alleviate such cold startup problem will be first reviewed. After that, our work based on the idea of internal heating using alternating current will be presented. It is shown that such methods can achieve quick startup with negligible degradation and minimal energy consumption. The issues and theory for the extension of the methods to battery and stack are discussed and validated with experiment. Finally, further research directions will be highlighted.</p>	
Biographical Sketch (Approximately 200 words)	<p>Dr. Jianbo Zhang received his PhD degree in Aerodynamics from the University of Tokyo, Japan. He worked in Nissan Research Center on the R&D of fuel cell and LIB during 2000~2011. He was offered the professorship in the Department of Automotive Engineering, Tsinghua University, China, and set up the Lab of Electrochemical Power Sources in 2011. His research interests center around the diagnosis and design of electrochemical devices such as fuel cell, lithium-ion cell, and electrolyzer. He co-authored the book <i>The Theory and Application of the Structure Design for Lithium-Ion Batteries</i> (in Chinese). He is a member of the Scientific Committee of International Symposium of Electrochemical Impedance Spectroscopy, a member of the Scientific Committee of European Fuel Cell Forum, and an editor for the journals <i>Battery</i>, <i>Automotive Innovation</i>, <i>eTransportation</i>, etc.</p>	

