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2021 WORLD FUEL CELL CONFERENCE

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Name	Erik Kjeang	
Affiliation	Simon Fraser University	
<h2 style="color: red;">Invited Keynote Lecture</h2>		
Presentation Title	Fuel Cell Durability Improvements Guided by 4D In-situ X-ray Visualization	
Abstract (Approximately 200 words)	<p>The global interest in hydrogen fuel cells for heavy duty vehicles is growing rapidly. However, the fuel cell durability requirements for heavy duty bus, rail, and truck applications are three or four times greater than for light duty passenger vehicles, which poses a significant challenge for membrane electrode assembly (MEA) design and integration. Our research addresses this challenge through customized X-ray computed tomography (XCT) visualization of miniaturized fuel cells subjected to accelerated stress testing. Given its non-invasive nature, the XCT methodology enables unique experimental workflows for 4D in-situ visualization by periodic, 3D identical-location imaging of fuel cells as a function of degradation time. Results obtained from post-processed 4D image sets are used to determine the failure mode, root cause of degradation, and other influential factors throughout the progression of a given degradation process. Knowledge gained from such experiments are subsequently used to develop mitigation strategies for durability improvement, which are then demonstrated and evaluated by repeat testing of aptly modified MEA designs. Specific examples will be given for improved mechanical, chemical, and chemo-mechanical membrane durability.</p>	
Biographical Sketch (Approximately 200 words)	<p>Dr. Erik Kjeang is an Associate Professor in Mechatronic Systems Engineering at Simon Fraser University (SFU) in Vancouver, Canada and Canada Research Chair in Fuel Cell Science and Technology Development. Dr. Kjeang obtained a Ph.D. in Mechanical Engineering from the University of Victoria, Canada and an M.Sc. in Energy Engineering from Umea University, Sweden. Prior to joining SFU, Dr. Kjeang worked as a research engineer at Ballard Power Systems. He has 17 years of experience with fuel cell research, focusing on electrode and cell design. Dr. Kjeang is also a recognized expert on fuel cell durability and recently contributed technology for enhancing and predicting membrane lifetime in fuel cell buses in collaboration with Ballard. His lab at SFU features Canada's first facility for multi-length scale X-ray tomography, which is optimal for visualization of electrochemical cells. He has raised more than \$20M in funding and authored 120 peer reviewed journal publications and 6 patents.</p>	