


# 16<sup>th</sup> International Green Energy Conference (IGEC-XVI) | June 30 – July 4, 2024

Name	Shigeki Hasegawa	
Affiliation	Kyoto University / Toyota Motor Corporation	
<h2 style="color: red;">Invited Plenary Lecture</h2>		
Presentation Title	<b>An integrated Fuel Cell System Simulator 'FC-DynaMo' for the Multi-Purpose Applications</b>	
Abstract (Approximately 200 words)	<p>A product fuel cell system (FCS) development requires the significant cost and effort in manufacturing prototypes, testing, and calibration of the controller due to its complexity, which has been regarded as one of the largest bottlenecks toward the promotion of FCS. An integrated FCS simulator 'FC-DynaMo' was developed to streamline the overall development process of the FCS. It consists of the 1-D physical and empirical models of the fuel cell stack, air supply system, hydrogen supply system, coolant system, electric power system, and related controllers. All codes are implemented efficiently on MATLAB/Simulink platform and can be easily customized to adapt to the various applications. It was validated with the considerable amount of data collected with the product FCS of 2nd-generation MIRAI, the state-of-the-art fuel cell electric vehicle, and users can focus on its application without a large concern on accuracy. In the recent research, the authors are extending its functionality to the estimation of the degradation rates of fuel cell materials and the detailed distribution of the reaction rates across the cell following the demands from the users of 'FC-DynaMo' in Japan.</p>	
Biographical Sketch (Approximately 200 words)	<p>Shigeki Hasegawa is a project-specific assistant professor (NEDO FC-Platform) at Kyoto University and project manager at Toyota Motor Corporation. He has engaged in various technical fields surrounding the fuel cell electric vehicle development, such as the material, cell, system component, and control development in the product and advance development phases at Toyota Motor Corporation since 2004. He has concurrently served at Kyoto University since 2021 and engaged in the research and development of the integrated fuel cell system simulator 'FC-DynaMo' and its application to the fuel cell system product development in the wide range of industries such as automotive, stationary electric power generator, railway, maritime, aviation, and construction and agricultural machinery. He has authorized more than 80 patents in the fuel cell technical field and delivered the fuel cell system simulator 'FC-DynaMo' to more than 70 researchers and industries in Japan. He has diversified his research activities to the modeling and experimental investigation of microscopic and system-scale mass and heat transport, electrochemical reactions in a fuel cell, degradation of fuel cell material as well as the computational simulation in his 20 years career and covering comprehensive technical fields surrounding the fuel cell industry.</p>	