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Effect of purging on the performance of a PEM fuel cell stack with a dead-end anode

Due to better hydrogen utilization, the interest in proton exchange membrane (PEM) fuel cell with a dead-end anode is growing. In such a fuel cell, higher fuel utilization is expected as the anode outlet is blocked, thus no excess hydrogen is wasted from the system. This design, however, results in water accumulation in the anode and nitrogen crossover from cathode to anode that lead to performance deterioration over time. To ensure good and stable stack performance, the purging is commonly employed to remove accumulated water and nitrogen properly. Since purging also results in some reduction of hydrogen utilization and addition of parasitic loads, an appropriate purging strategy is necessary to achieve the optimal fuel cell performance. This talk describes our current research program to develop better understanding of purging parameters on the performance of a PEM fuel cell stack with a dead-end anode. The experimental investigations were carried out by using a 300cm², 24-cell PEM fuel cell stack with the rated power of 1.5kW. The stack was operated with water cooling, fully humidified air and dry hydrogen at the ambient pressure. Using the results of these investigations, the talk will discuss the effects of purging frequency and duration and their interactions with the cathode air-stoichiometry. The talk will also discuss the effect of purging on the stack performance during transient conditions.

Biography

Tariq Shamim is a Professor of Mechanical Engineering at the Masdar Institute of Science and Technology. He specializes in the broad area of sustainability with special focus on clean energy technologies. He earned his Doctorate in Mechanical Engineering and a Master's in Aerospace Engineering from the University of Michigan - Ann Arbor. He has been actively involved in many professional organizations including ASME, SAE and Combustion Institute. He is currently serving as a Subject Editor of *Applied Energy* journal. He is a recipient of several awards including SAE International Ralph Teetor award for excellence in teaching (2004).

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