Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Quantitative Visualization of Water Distribution in an Operating Polymer Electrolyte Fuel Cell SEUNG-GON KIM, SANG-JOON LEE, CENTER FOR BIO-FLUID AND BIO-MIMIC RESEARCH, DEPARTMENT OF MECHANICAL ENGINEERING, POSTECH, KOREA TEAM — The objective of this study is to visualize the temporal evolution of water in an operating (*in situ*) polymer electrolyte fuel cell (PEFC). To achieve this, the synchrotron X-ray radiography with high spatial and temporal resolution is employed. X-ray images of water inside individual PEFC components, such as the polymer membrane, gas diffusion layer (GDL), and endplate, are captured consecutively. As a result, the in-plane water distribution of water in the PEFC components is quantitatively visualized by adopting image normalization method. The temporal evolution of water in the anode GDL exhibits the back diffusion effect clearly. To examine the water accumulation phenomenon in the PEFC, X-ray μ-tomography method is adopted for visualizing the internal structure of GDL. The accumulation phenomenon seems to be attributed to the concentrated porosity in GDL structure. The water-saturation characteristics at the cathode GDL, including saturation time and speed, are found to be quite different from those at the anode GDL.

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Date submitted: 03 Aug 2010 Electronic form version 1.4