Application Note BATT1039

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BATT1039: Internal structure evaluation of fuel cell membrane electrode assembly (MEA)

Introduction

To improve the performance and quality of fuel cells, it is important to evaluate the internal structure of the gas diffusion layer (GDL) in the membrane electrode assembly (MEA), a multifunctional base material responsible for gas diffusion, electron collection, and discharge of produced water. GDLs are composed of low-density materials such as carbon fiber, and conventional X-ray CT imaging using high-energy X-rays does not provide contrast because X-rays are not absorbed by GDLs, making it difficult to analyze pore size and diffusion pathways. The nano3DX, which is capable of low-energy X-ray CT imaging, makes it possible to visualize and evaluate the structure of GDLs, and is expected.

Non-destructive analysis

- **Analysis:** Fuel cell
- **Use:** Optimizing electrochemical performance
- **Analyzed materials:** MEA, Membrane Electrode Assembly
- **Analysis software:** ImageJ

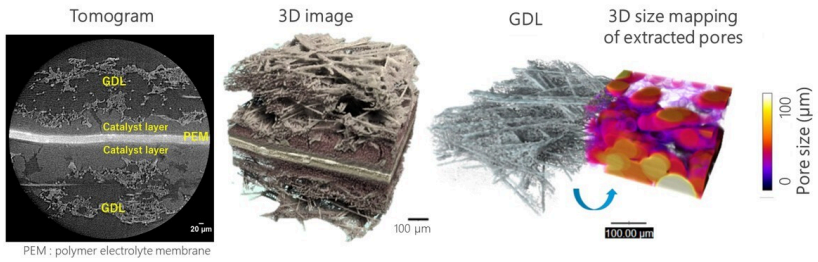

Figure 1: X-ray CT image of a membrane electrode assembly (MEA) and analysis of gas diffusion layer (GDL) pores.

Conclusion

CT imaging using low-energy characteristic X-rays of the nano3DX enabled high-contrast and clear observation of GDLs even in the presence of electrolyte membranes with high-density platinum catalyst attached. By visualizing the internal structures of all the substrates comprising the prototype MEA in three dimensions and quantitatively evaluating structural indices such as the GDL pore size, it will be possible to study the optimization of the MEA preparation conditions.

Related products

nano3DX

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