

Scale-up development of electrodes for fuel cells and water electrolysis

We support the establishment of design guidelines for electrode mass production processes aiming for "high performance and high reproducibility"

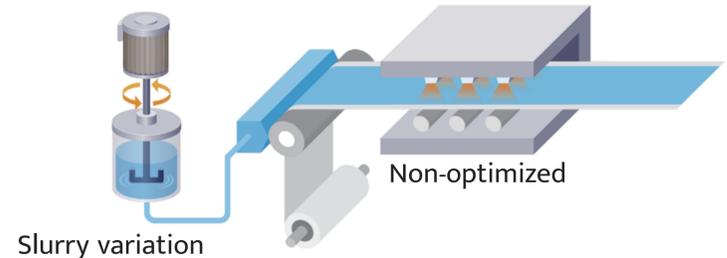
Technical issues

The performance achieved by mastering the use of materials in a lab environment cannot be reproduced on a mass production scale, posing a barrier to scaling up.

<Major Factors>

- Variations in electrode structure due to slurry
- Suboptimal coating and drying processes
- Component performance ≠ mass production performance

Image of electrode formation

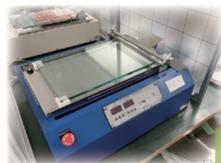


Initiatives and proposals for technical issues

We believe that mass production is what makes a technology, and we are working on development that starts from the "process" rather than the "components"

- Establishment of ink design guidelines suitable for mass production
- Control of electrode structure by optimizing coating and drying

<Facilities owned and development process according to development stage>

Development Phase	Material-based development	Connecting the lab and mass production environment	Process-driven development
Facility Scale	Lab Machine	Pilot machine (lab scale)	Pilot machine (mass production scale)
Slurry Preparation	Batch-type ultrasonic disperser  High-performance slurry	Circulation-type ultrasonic disperser  Highly stable slurry	Circulation-type ultrasonic disperser 
Electrode Coating	Tabletop applicator  Uniform film thickness	Tabletop die coater  Crack control	Die coater 
Development Objectives	• Slurry design • Electrode structure formation that combines high performance and durability	• Establishing an electrode fabrication process for scale-up	• Identifying and addressing issues through prototyping
Development Issues	• Processes that are not suitable for scale-up	• Slurry design that takes into account shear during application	• Control of electrode structure by integrating coating and drying processes

Using a lab-scale pilot machine to solve development issues on a mass-production scale, we achieved component performance that is equal to mass-production performance