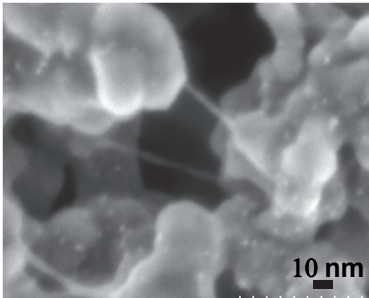


Morphological analysis of ionomer and catalysis in PEFC's Cathode

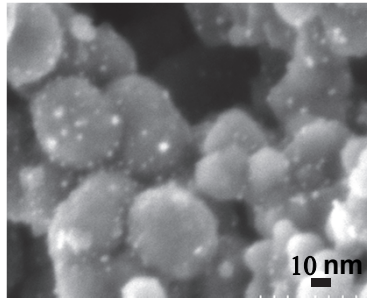
Distribution of cathode component and segregation of elements greatly influence the fuel cell battery performance. Slight differences between samples can be evaluated by FE-SEM (Field Emission Scanning Electron Microscope), SEM-EDX (Scanning Electron Microscope -Energy Dispersive X-ray spectroscopy), and FE-EPMA (Field Emission Electron Probe Micro Analyzer).

FE-SEM and FE-EPMA analysis of cathode

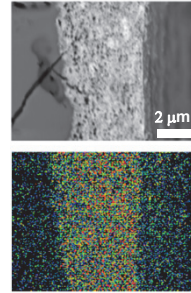
Cathode A



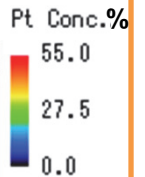
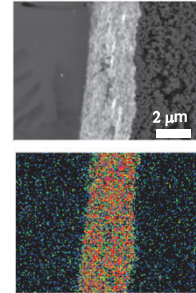
Cathode B



Cathode A



Cathode B



■ It becomes clear by FE-SEM that there are a lot of thread-formed ionomer in Cathode A and big catalysis particle in Cathode B.

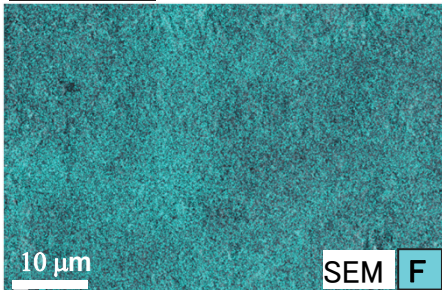
■ It is revealed that thickness of electrode decreases and Pt is concentrated in Cathode B by FE-EPMA..

Morphology of ionomer/carbon and density distribution of Pt is able to confirmed.

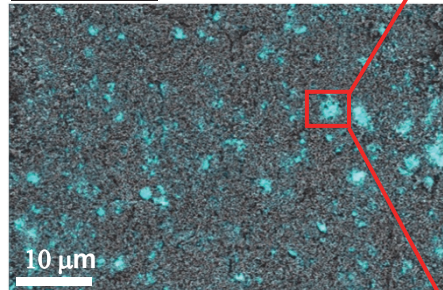
High detection efficiency SEM-EDX analysis of ionomer in Cathode

Low damaged analysis by high detection efficiency EDX enabled to analysis exactly distribution of F which becomes the index of ionomer. In high magnification analysis that high electron beam is irradiated , distribution of F can be caught clearly without change in quality and transformation.

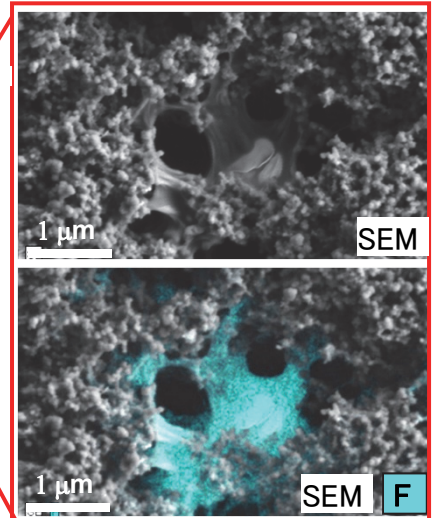
Cathode C



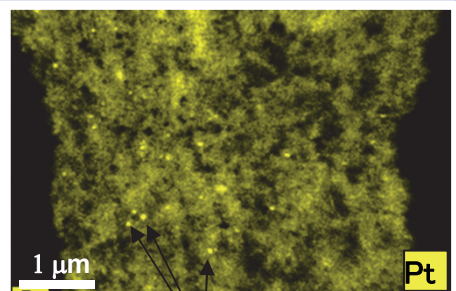
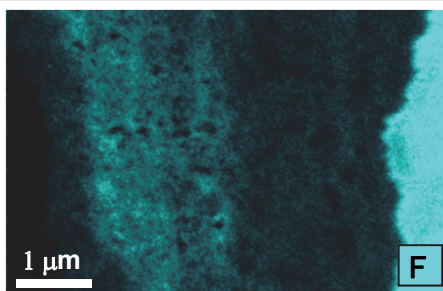
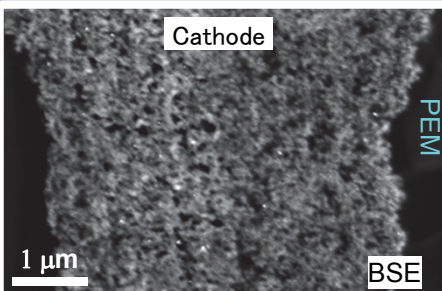
Cathode D



■ Ionomer in Cathode C is not segregated, otherwise that in Cathode D is segregated.



High resolution SEM-EDX analysis of ionomer/catalysis by using thinned specimen



■ Ionomer segregates at the surface of Cathode.

■ There are many Pt aggregation which size is about 10 numbers nm in segregated area of ionomer..

Pt particle aggregation

More correct distribution of ionomer/catalysis with little information of depth by using thinned specimen is enabled to evaluate.