

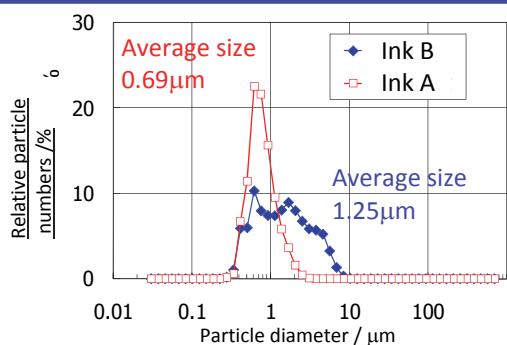
Morphology observation of the component in catalyst ink

Performance of PEFC can be affected by particle size distribution of carbon supported catalyst, dispersion state of ionomer in catalyst ink. Those information can be obtained by submerged AFM and TEM observation.

Manufacture method of catalyst ink

- Catalyst ink with same carbon-supported catalyst, ionomer and solvent but different stirring method (Ink A and B)
- Better performance with catalyst ink A, beads stirring than catalyst ink B, mechanical stirring (Catalyst (TEC10E50E) and the data of PEFC performance was provided by Prof. Hori, Daido university)

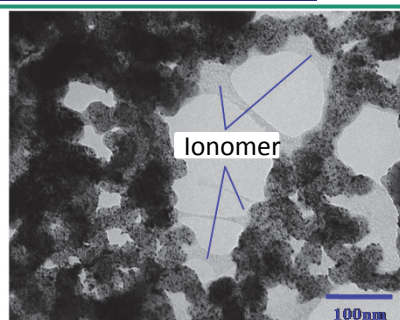
Particle distribution in catalyst ink (Light diffraction / scattering)



- Ink A possesses narrow distribution around several hundred nm
- Ink B possesses 2 peaks, around several hundred nm, and around several hundred nm

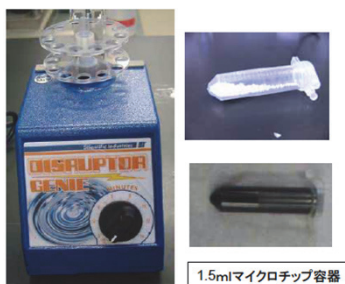
TEM observation of catalyst layer

Beads stirring : Ink A



- Ionomer in the catalyst layer can be observed by TEM.
- Further analysis, such as the coverage of catalyst supported carbon by ionomer, can be done by TEM tomography with staining.

Beads stirring : Ink A

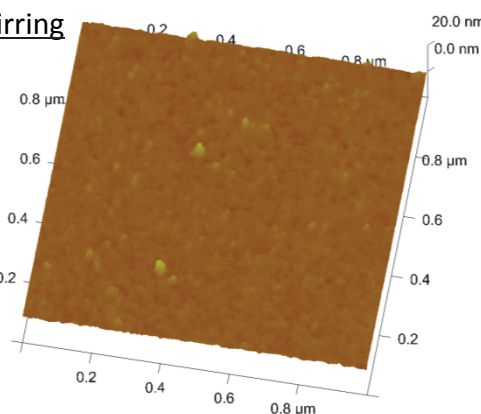


Mechanical stirring : Ink B

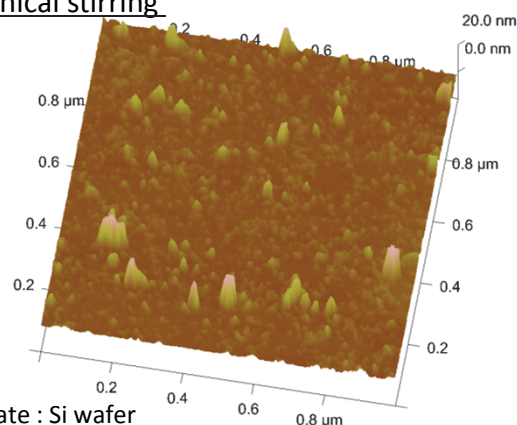


Morphology observation by submerged AFM

Beads stirring : Ink A



Mechanical stirring : Ink B



Substrate : Si wafer
Diluted by H₂O / n-propanol = 70/30

- Beads stirring can provide more homogeneous and finer distribution than mechanical stirring.
 - Beads stirring : particle around 10~30 nm
 - Mechanical stirring : particle around 10~50 nm
- Those are primary particles of ionomer and/or carbon

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