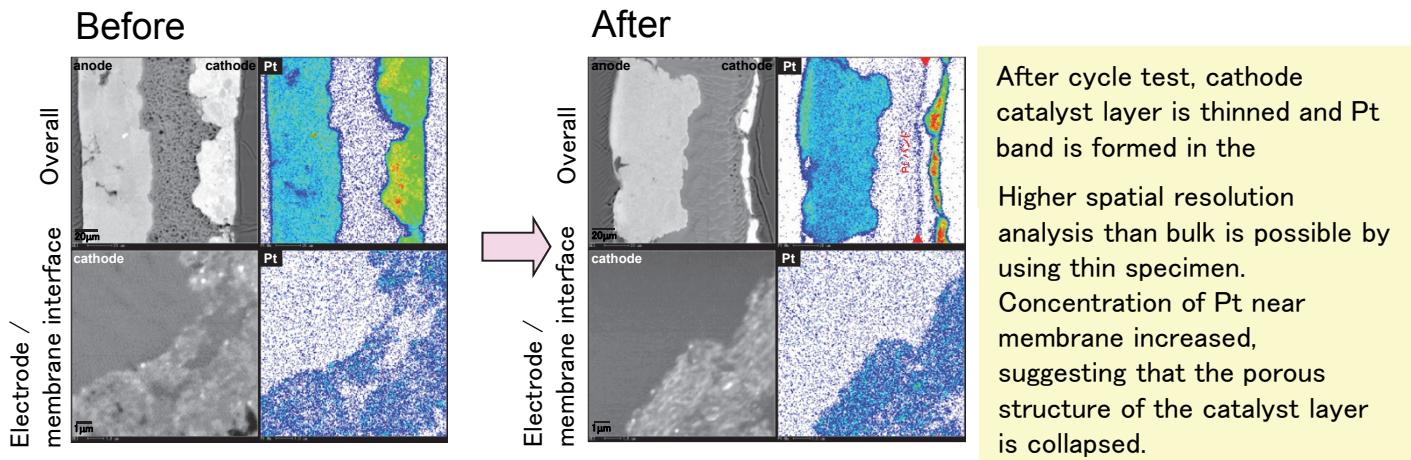


PEFC MEA degradation evaluation

—Morphological observation and microanalysis—

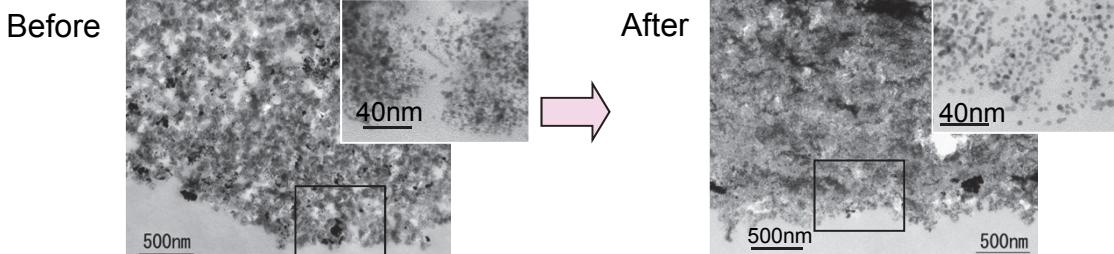
Changes in morphology and elemental distribution of Membrane Electron Assembly(MEA) are evaluated by EPMA and TEM ,before and after operation of Polymer Electrolyte Fuel Cell(PEFC) . It is possible to recognize changes due to degradagion of MEA, such as presence of Pt dissolved and reprecipitated in electrolyte membrane, element segregation, change of catalyst layer thickness, coarsening of catalyst particles, etc.

1. EPMA analysis before and after power generation test



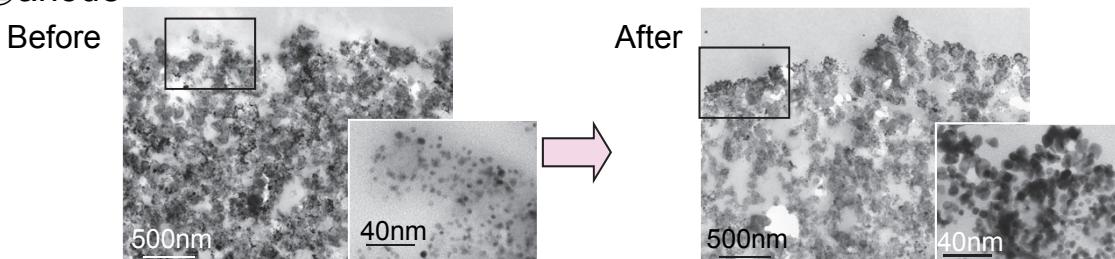
2. TEM analysis before and after power generation test

①cathode



- ①After cycle test, porous structure is collapsed.
- ②Coarsening of catalyst particles is observed.

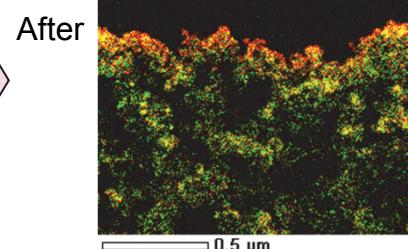
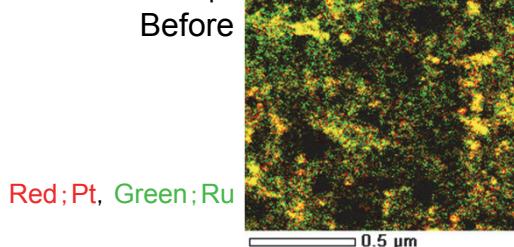
②anode



Coarsening of catalyst fine particles at the catalyst layer / membrane interface is observed

anode

EDX elemental map



Before cycle test:
Distribution of Pt and Ru is uniform.
After cycle test: Pt moves to the membrane interface.. Ru is rich in the catalyst layer.