



Development of corrosion-resistant materials based on the dissolution mechanism of metal

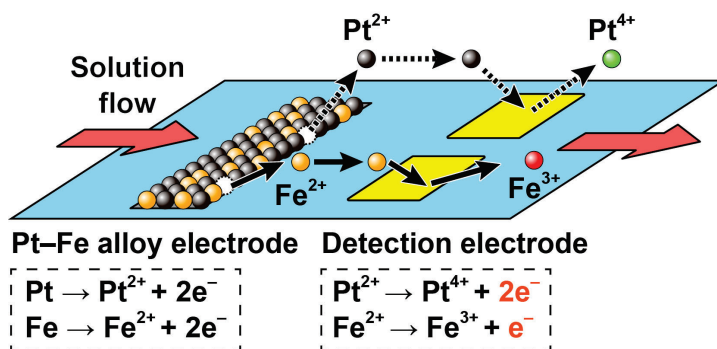
Laboratory for Materials and Structures, Division of Materials Integration
Laboratory for Future Interdisciplinary Research of Science and Technology,
Advanced Materials Research Core

<http://www.elechemcorr.mtl.titech.ac.jp/>

- Durability evaluation of electrocatalysts for PEFCs
- Dissolution mechanism of metal at nanoscale
- Soil corrosion mechanism of steel
- Corrosion mechanism of steel under supercritical CO₂ environment
- Hydrogen adsorption and absorption behavior of steel

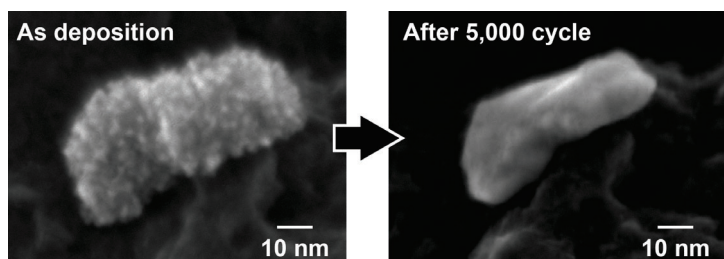
Our research spans various metal materials, encompassing various types, sizes, and application environments. Although our targets are diverse, our key focus is on elucidating the dissolution mechanisms of metal materials to solve the various societal challenges that arise from such degradation.

To this end, we are refining techniques that enable us to monitor the dissolution mechanism at the nanoscale within the materials' actual service environments. Our approach integrates electrochemical measurement, solution analysis, electron microscopy, and numerical simulations.



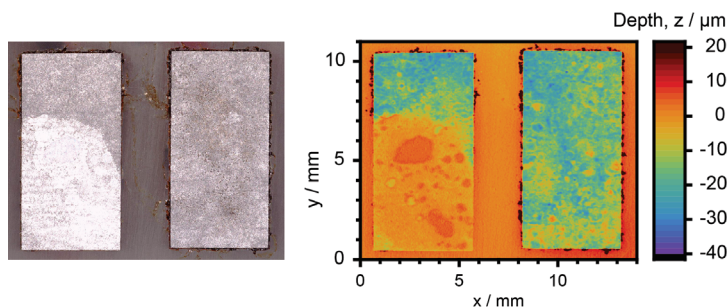
Development of a Channel Flow Multi-Electrode Technique

- In-situ detection of dissolved ions including their valence
- The extremely low detection limit of quantitation (approx. 10 pg cm⁻² s⁻¹)



Evaluation of dissolution and degradation of metallic materials at the nanoscale

- Evaluation of surface morphological changes at the nanometer level
- Evaluation of the dissolution mechanism by identical-location observation



Research on Soil Corrosion of Steel Materials

- Nondestructive monitoring of corrosion rate using electrochemical measurement
- Evaluation of corrosion morphology using 3D profilometers