Realization of common platform technologies, facilities and equipment that create innovative knowledge and products

R&D Project Title : Development of a 3D multiscale and multimodal operando chemical analysis platform

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Summary :

We aim to develop a multiscale and multimodal chemical analysis platform by means of X-ray computed tomography and X-ray absorption fine structure spectroscopy, which enables us to three-dimensionally evaluate microstructure and distribution of chemical elements/states in devices under operation. In addition, the methodology of coupled numerical analysis for mass transport and reaction while taking the device microstructure into account will be established. By utilizing the developed noncontact and nondestructive analytical platform, we will clarify dominant factors for device characteristics, degradation and failure, and will propose design concepts for device improvement. In this project, we will first investigate secondary batteries as a main target device, and thereafter will apply the developed platform to operando analysis of other applications, such as fuel cells, electrolyzers, semiconductor devices, composite materials, catalysts and so on.