Tohoku Univ. Technology

Analysis of Nano-Microscale Transport Phenomena

Large-Scale numerical simulations for development of fuel cells, secondary batteries, semiconductor film formation, etc.

Overview

Fuel cell

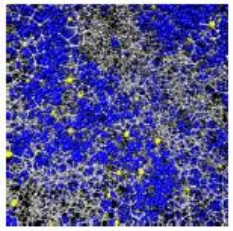
In order to construct a fuel cell system with high efficiency, high durability and low cost, it is necessary to clarify the transport phenomena of proton, oxygen, and water in the cell. By analyzing nano and micro scale flow phenomena and clarifying the correlation between the structural characteristics and the transport mechanism of each component, PEFC performance is expected to be improved.

Secondary battery

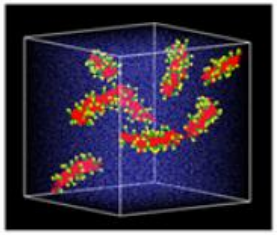
Due to increasing energy demand and environmental problems, secondary batteries that can be charged and discharged without emitting CO_2 or nitrogen oxides are attracting attention. We have a track record of analyzing nano and micro scale flow phenomena such as ion flow in the electrolyte inside liquid and all-solid-state lithium-ion batteries.

Semiconductor

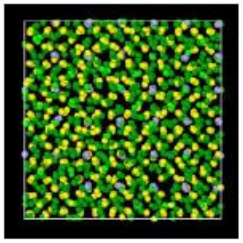
For advanced semiconductor devices, controls on the atomic layer level with a thickness error of ±0.5 Å on the wafer is required for the deposition process. In the past, it was necessary to optimize a large amount of experimental data in order to form a precise thin film. At Tokumasu Laboratory, we will elucidate the mechanism through numerical simulation and search for the optimum deposition mechanism.



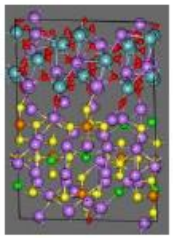
Water cluster aggregation state in polymer membrane



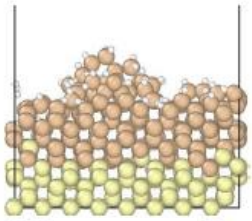
Ionomer aggregation state in catalyst ink



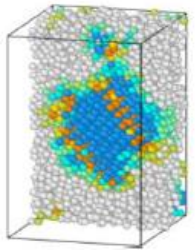
Analysis of Li ion transport in solid electrolytes



Li ion transport analysis of cathode active material / coating material interface



Si deposition process by CVD method



Si crystal growth process in Si solution

We can build a simulation model that meets your needs. Please feel free to contact us.

IP Data

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