

SCIAZKO LAB.

Energy and Porous Materials



Department of Mechanical and Biofunctional Systems

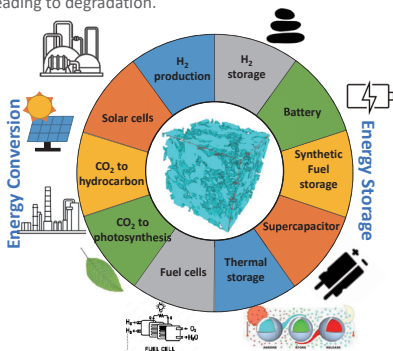
Thermal and Electrochemical Processes Engineering

Department of Mechanical Engineering, Graduate School of Engineering

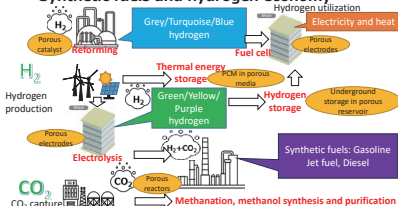
<https://sites.google.com/g.ecc.u-tokyo.ac.jp/sciazkolab>

Porous materials in fuel processing and energy technologies

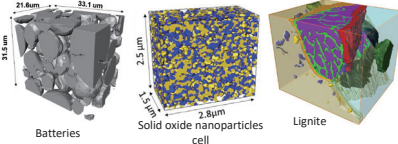
Efficient energy utilization and fuel processing are crucial from the technological, environmental and social points of view. Numerous energy conversion technologies rely on porous structures. Within our laboratory, we specialize in the production and utilization of synthetic fuels alongside electrochemical reactions within electrolysis and fuel cell systems. Our emphasis lies in understanding the intricate relationship between the microstructures of energy devices, their performance, and the mechanisms leading to degradation.



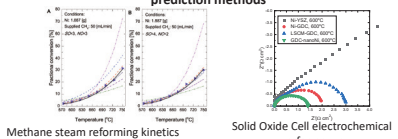
Synthetic fuels and hydrogen economy



3D porous multiphase microstructure fabrication and characterization methods

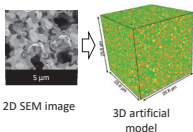


Thermophysical and electrochemical properties characterization and prediction methods

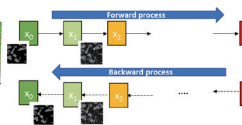


Prediction of porous materials' microstructure and its evolution using machine learning

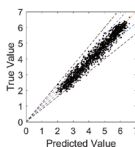
Improving the measurement by super-resolution, segmentation algorithms and 3D reconstruction from 2D image



Generating artificial microstructures with defined properties with diffusion models and C-GAN networks



Predicting 3D parameters from 2D cross-section with CNN network



Predicting performance and microstructure degradation by LSTM and UNIT networks

