

Integrated Research Center for Sustainable Energy and Materials

[Materials and Energy for the Future]

Established in April 2021 for a six-year period.

Director: Naoki Shikazono

<http://susmat.iis.u-tokyo.ac.jp/english/about.html>

Integration of Materials Engineering and Energy Engineering for Realizing a Sustainable Society

This center started its activities in April 2016 with the aim of proposing measures in terms of “energy and materials” to achieve a sustainable society. We have formed a core center of “energy, resources and materials” research, disseminated research activities in materials engineering and energy engineering and their fusion fields, strengthened industry-academia and international collaborations, and supported for the development of new collaboration by young faculty members.

Since April 2021, we have renewed our center and have continued activities to solve problems in the technologies in energy and material to realize a carbon-neutral sustainable society and its social implementation. In order to establish a truly sustainable energy society, an energy-saving energy grid system that combines renewable energy with electrification to achieve “CO₂ net zero emissions” and “beyond zero” is indispensable. From the upstream energy supply to the final use, we are discussing a method of optimizing the energy problem with collaboration between material research and energy research.

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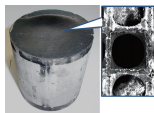
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Research Topics

Resources / Materials Recycling Unit:

— Design of Resources/Substances/Materials Flow and Process Control —

- Process development based on international material flow
- Analysis of generation, immobilization, and recycling of hazardous substances
- Development of recycling processes for exhaustible resources including rare metals
- Improvement of production technologies for base materials

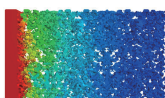


Recovery of platinum group metals (PGMs) from automobile scraps

Energy / Resource Efficient Utilization Unit:

— Base Engineering for a Low Energy Consumption Society —

- Improvement of power density and reliability of solid oxide fuel cell
- Development of novel heat technologies for heat engines and heat pumps
- Solution growth of eco-semiconductor SiC and AlN
- Development of electrochemical catalysts with high activity
- Determining of economic indicators for energy and materials market

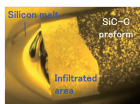


Distribution of electrochemical potential of ion of the fuel electrode in SOFC

Advanced Substances / Materials Design Unit:

— Material Engineering for Maximized Utilization of Resources/Materials —

- Design and fabrication of polymers and glasses with a reduced environmental load
- Development of chemical technologies for biomass utilization
- Process development and analysis of ultra-long-life materials
- Development of novel high-efficiency thermoelectric materials

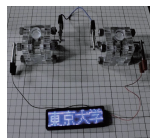


In-situ observation of SiC/SiC fabrication by reactive Si melt infiltration

New Research Fields Promotion Unit:

— Strong Cooperation with Industry —

- Development of novel materials for energy storage
- Atomic-scale optimization for prolonging material lifetime
- Optimization of waste treatment of significant amounts of structural materials
- Development of Innovative deposition technology of widegap semiconductor
- Establishment of recycling technology for socially valuable materials



Zinc-air batteries fabricated using a Co-Ni composite sulfide as an oxygen reduction catalyst