

Realization of a low carbon society through game changing technologies

R&D Project Title Intermediate temperature hydrogen membrane fuel cells

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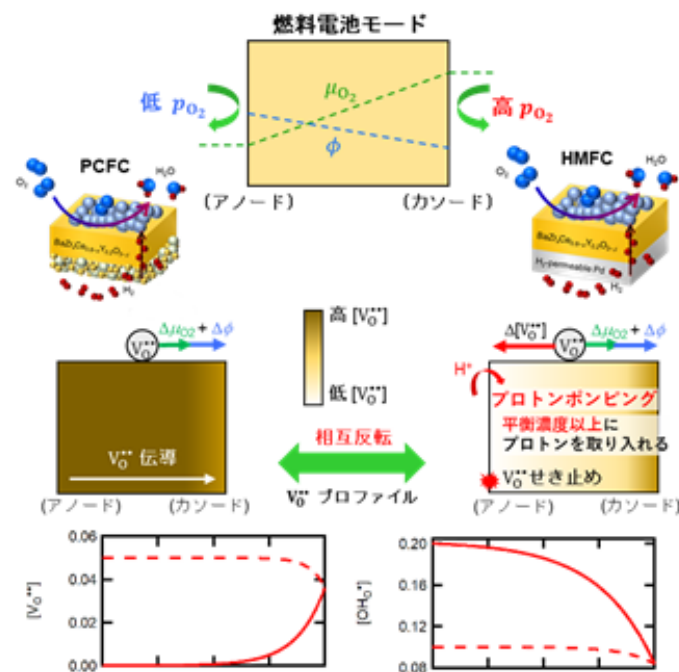
R&D Team : National Institute of Advanced Industrial Science and Technology, Institute of Molecular Science



Summary :

We are willing to develop highly efficient fuel cells operating at temperatures below 500°C, which must be useful in versatile applications. For this objective, we demonstrate the fuel cell energy conversion boosted by proton pumping in solid-solid heterojunctions.

- Problem: The current solid oxide fuel cells (SOFCs) can be operative at $T > 800^\circ\text{C}$, which causes serious problems of material corrosion and limits a choice of materials .
- Solution: Reduce the operation temperature to less than 500°C aided by encouraged ionic transfers at electrode/electrolyte interfaces.
- Outputs: Highly-efficient, cost-effective fuel cells can be available, which can be useful for a distributed power supply system.



Concept of proton pumping at H-permeable anode/H⁺-ceramic electrolyte solid-solid heterojunction