Research Hotline

UPDATE FROM THE CUTTING EDGE

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The abstracts of the recent research information appearing in Vol.11 No.1-3 of "AIST TODAY" are introduced here, classified by research areas.
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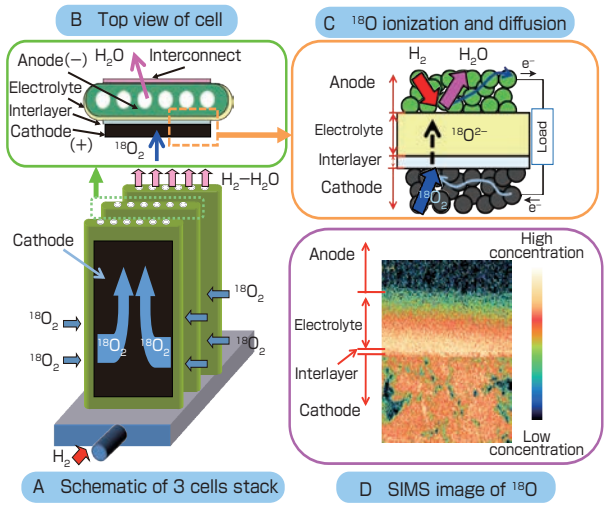
Environment and Energy

Visualization of oxide ionic flow inside the solid oxide fuel cells (SOFC)

Development of new analytical tools for understanding of SOFC reaction mechanism

We have developed a labeling technique using stable isotope oxygen (^{18}O) for "direct observation" of oxygen/oxide ion movements at the cathode/interlayer/electrolyte interfaces in a practical flatten-tube solid oxide fuel cells. The traces of oxygen motions were labeled during fuel cell reaction (current density of 0.25 A/cm^2 at 650 °C), and the ^{18}O incorporation and diffusion were visualized in a "frozen state" by secondary ion mass spectrometry (SIMS). The active ^{18}O ionization and incorporation sites were found to be in the CeO_2-interlayer between cathode and electrolyte. The higher ^{18}O-concentration in the electrolyte was identified at the bottom of cell (higher current density at bottom).



Schematic diagrams of $^{18}O_2$ incorporation into flatten tube SOFC stack (A), diffusion of ^{18}O inside the single cell (B), diffusion of $^{18}O_2$ and ionic flow of $^{18}O^{2-}$ (C), and SIMS image of ^{18}O at the interfaces (D)

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