Fuel Cell Components and Material Development

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Content

- Development and characterisation of innovative materials for HT-PEM
- Investigation of degradation of fuel cell components
- FC modeling software with real time functionality for fuel cell component development
- Production of hydrogen by reduction/oxidation of metal oxides

Development and characterisation of innovative materials for HT-PEM

- Development of innovative materials for electrodes and electrolytes
- Lowering Pt-loading in electrode
- Development of a new method for production of electrodes based on nanofibres

Investigation of degradation of fuel cell components

- Membrane degradation at OCV operation
  - State of the art
  - OCV Tests at standard conditions
  - OCV Tests at low temperature
  - OCV Tests at low humidification
- Electrode degradation at OCV and low current densities
  - Effect of high potentials at the cathode outlet at low current densities
  - Current densities / electrochemical potentials at dead end operation

Investigation of degradation of fuel cell components

- In-situ membrane degradation tests under OCV conditions
- Five fuel cells are tested simultaneously
- Duration of OCV tests: 33 days (800 h)
**Performance Loss**

- In-situ membrane degradation tests under OCV conditions
- Five fuel cells are tested simultaneously
- Duration of OCV tests: 33 days (800 h)

**Change in membrane resistance**

- Investigation of degradation of fuel cell components

**Hydrogen Diffusion**

- In-situ membrane degradation tests under OCV conditions
- Five fuel cells are tested simultaneously
- Duration of OCV tests: 33 days (800 h)

**Fluoride Emission Rate**

- Investigation of degradation of fuel cell components

**Electrode degradation at OCV and low current densities**

- Effect of high potentials at the cathode outlet at low current densities / critical Potential
- Current densities / electrochemical potentials at dead end operation

**Segmented Cell**
FC modeling software with real time functionality for fuel cell component development
- Development and integration of FC models with RT capability into GenFC
- GenFC: Generic Fuel Cell Modeling Environment (EC project)
- Tasks:
  - Development of FC models with RT capability (PEMFC & SOFC)
  - Interface GenFC/LabVIEW
  - Integration into LabVIEW
  - Visualization with Application Terminal
- Available online in autumn 2008
  www.genfc.org

Production of hydrogen by reduction/oxidation of metal oxides
- Renewable energy carriers
- Cyclic process at elevated temperatures
- Degradation of the contact mass due to sintering
- Improving lifetime by the addition of foreign, structure stabilizing metals


Production of hydrogen by reduction/oxidation of metal oxides
- Renewable energy carriers
- Cyclic process at elevated temperatures
- Degradation of the contact mass due to sintering
- Improving lifetime by the addition of foreign, structure stabilizing metals
- Stability of 500 cycles achieved

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Thank you for your attention!