Stack Components

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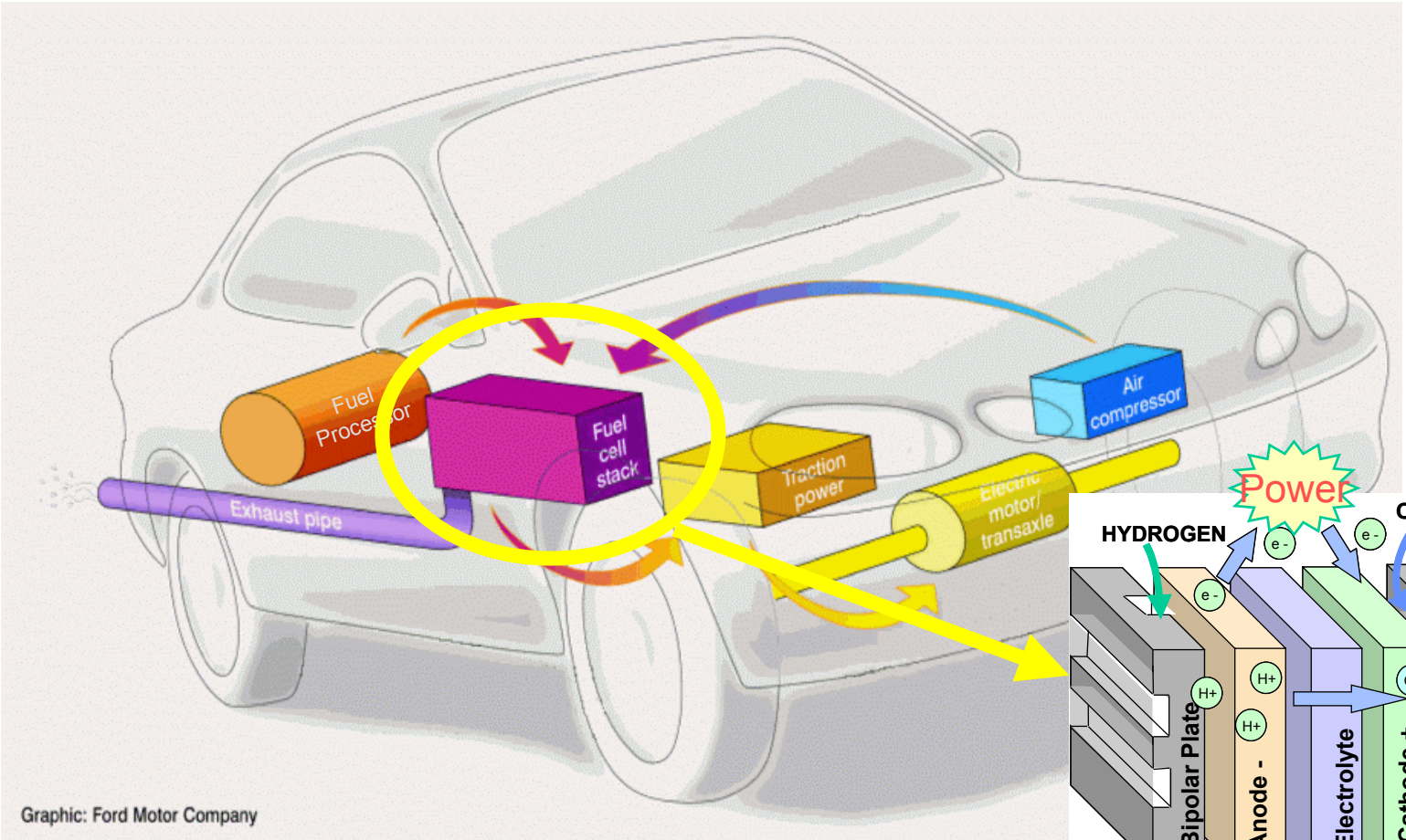
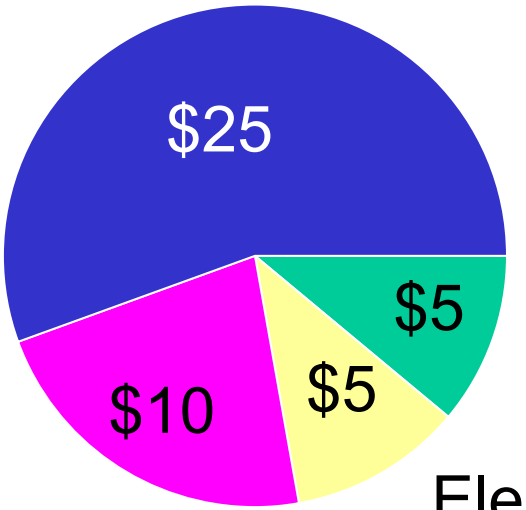
Stack Components



Example shown is for acidic electrolytes

Stack Component Barriers

Fuel Cell Power Systems
$45/kW



BARRIERS

- Stack material cost/manufacturing
- Durability
- Electrode performance
- Thermal and water management

Stack Component Targets

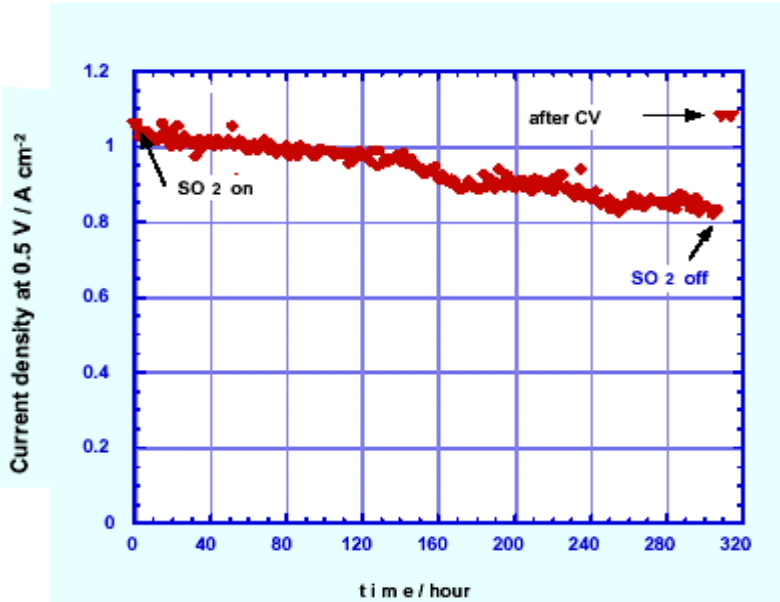
Component	Characteristics	Units	Target
Membranes	Cost	$/kW	5
	H_2 Crossover	mA/cm^2	<1
	O_2 Crossover	mA/cm^2	<3
Electrodes	Cost	$/kW	5
	CO Tolerance (steady state)	ppm	500
	CO Tolerance (transient)	ppm	1000
	Durability	hours	5000
MEA	Cost	$/kW	10
	Performance on H_2	mA/cm^2	400 @ 0.8 V
	Performance on O_2	mA/cm^2	500 @ 0.75 V

Funding and Partners

- FY03 enacted: $14.9M
- FY04 request: $28M
- R&D partners: De Nora North America, 3M, UTC Fuel Cells, CWRU, Superior MicroPowders, ORNL, LANL, LBNL, NRL, BNL, Porvair, Fuel Cell Energy, SwRI

Accomplishments

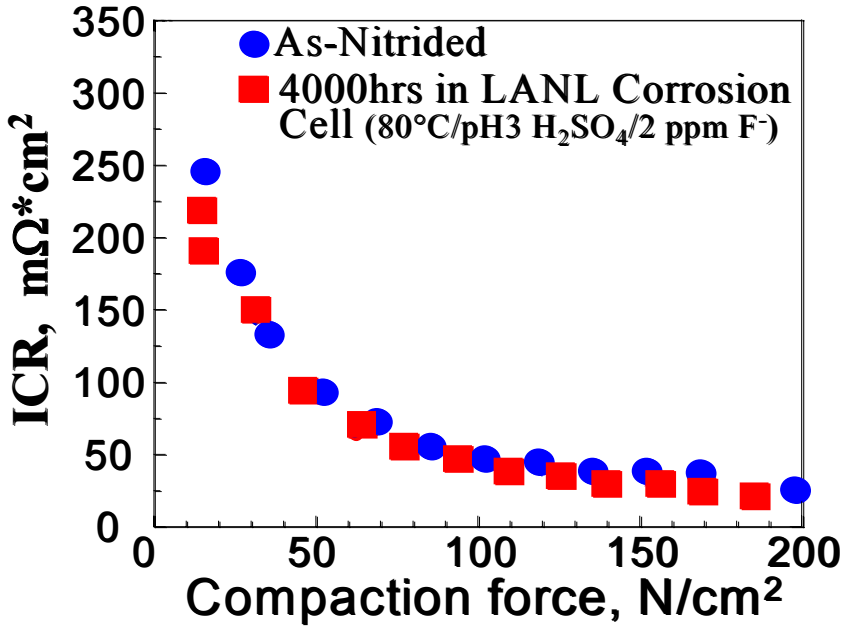
Effect of Ambient Air Impurities on the cathode : Life test with 500 ppb SO_2 - LANL



- Cell current dropped about 20 % during 300 hrs of exposure to SO_2
- Cell performance recovered after CV

T= 80 °C
A: 0.18 mg Pt/cm^2; 1.3 H_2 stoich
C: 0.22 mg Pt/cm^2; 2.5 air stoich
20% Pt/C ETEK, N1135

Surface Modified Metallic Bipolar Plates: Promising contact resistance behavior achieved by model nitrided Ni-50Cr alloy - ORNL



- In collaboration with LANL (K. Weisbrod) and NREL (H. Wang)
- Initial testing at General Motors indicates nitrided Ni-50Cr meets their contact resistance goals (R. Blunk, M. Abdelhamid)

Future Directions

- Topics in recent solicitation: stack durability, cost reduction and high temperature membranes, and non-precious metal catalysts
- Recent SBIR topic (DOE Office of Science): non-precious metal catalysts
- **Emphasis**
  - **New membranes - performance from room temperature to 120-150ºC; mechanical stability; fabrication into MEA**
  - **Low-Pt and non-precious metal catalysts - cost reduction and improved cathode performance**
  - **Bipolar plates - cost reduction**