Novel SOFC Anodes with Enhanced Tolerance to Coal Contaminants

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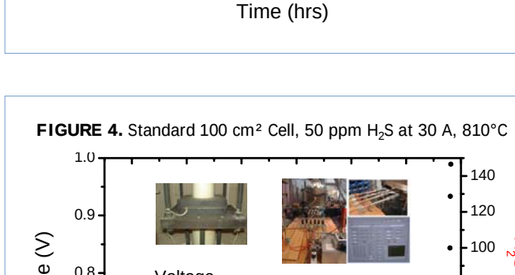
Project Description

- ❑ **Develop metal-ceramic (cermet) composite SOFC anodes**
- ❑ **Improve resistance to key coal contaminants, H_2S, PH_3, and AsH_3**
- ❑ **Based on the proven nickel-zirconia cermet anode**
- ❑ **With some modifications, if needed, on anode support and/or anode interlayer**

Approach for Anode Design



(M) = Secondary metal electrocatalyst / MIEC = mixed ionic electronic conductor

Phase-I Achievement

- ❑ **Tested the current SOFC anode for the effect of H_2S (1~50 ppm)**
- ❑ **Excellent tolerance to H_2S in the concentration range up to 50 ppm**
- ❑ **Consistent results with different cells (FIGURE 1 & 2 for button size cells (FIGURE 3 & 4 for 100 cm² cells)**
- ❑ **A few modified-anode cells show also promising results (FIGURE 5 & 6)**

FIGURE 1. Standard Button Cell, 1.2 ppm H_2S at 0.4 A, 700°C

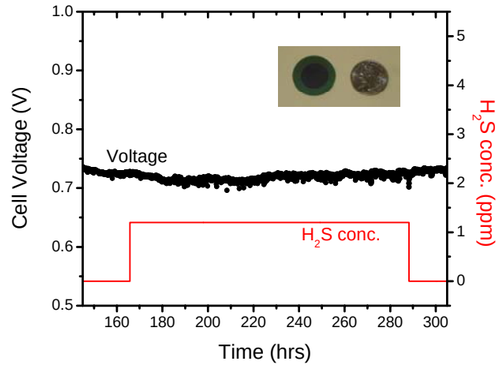


FIGURE 2. Standard Button Cell, 1.2 ppm H_2S at 0.6 A, 750°C

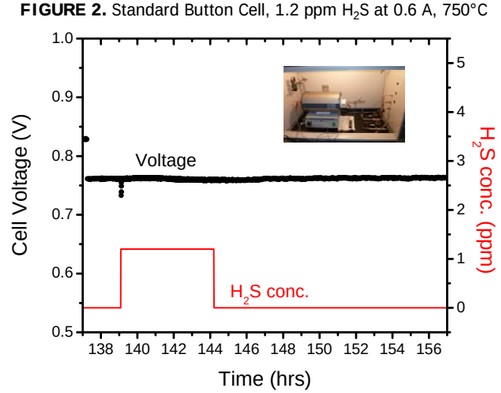


FIGURE 3. Standard 100 cm² Cell, 50 ppm H_2S at 20 A, 730°C

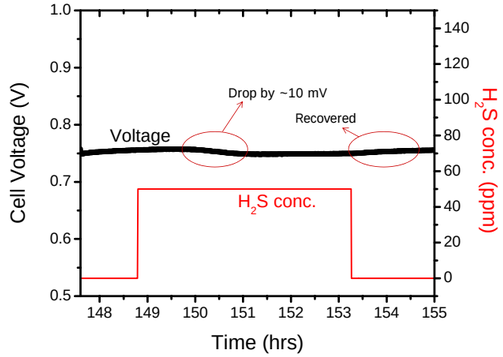


FIGURE 4. Standard 100 cm² Cell, 50 ppm H_2S at 30 A, 810°C

FIGURE 5. Modified-Anode Button Cell, 1.2 ppm H_2S at 0.4 A, 750°C

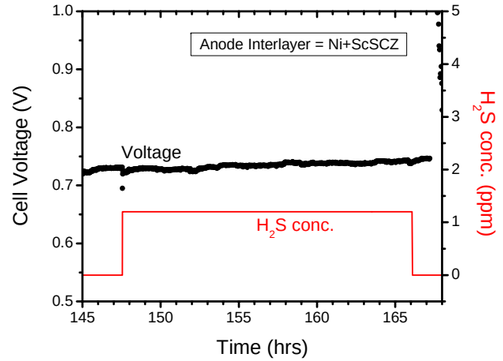


FIGURE 6. Modified-Anode Button Cell, 1.2 ppm H_2S at 0.4 A, 700°C