CATALYSIS OF ELECTROCHEMICAL OXIDATION OF CH_4 AND COAL-DERIVED COKE IN A SOLID OXIDE FUEL CELL

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The direct electrochemical oxidation of coal in the Solid Oxide fuel cell (SOFC) could offer significant advantages: (i) achieving high energy efficiencies, (ii) eliminating complication from coal gasification, and (ii) producing a nearly pure CO_2 exhaust stream for the direct CO_2 sequestration. Electrochemical oxidation of coal-derived CH_4 and carbon in a SOFC requires the use of highly active anode catalysts that exhibit resistance to carbon deposition and sulfur poisoning. A fundamental understanding of the mechanism of the electrochemical oxidation of CH_4 and carbon on the anode catalyst surface could provide the scientific basis for the development of such catalysts. This poster presentation will report results of an experimental study of the electrochemical oxidation of sulfur-containing CH_4 and coke on a Cu-Ni cermet anode. The performance characteristics (current-voltage performance) of the Ni and Cu-Ni anode were correlated with their microstructure. The Cu addition was found to enhance sulfur resistance and carbon tolerance of the Ni anode.