**Impact of Fuel Contaminants on Performance in Coal-Based SOFCs**

U.S. Dept of Energy, National Energy Technology Laboratory, Morgantown, WV 26507
**Kirk Gerdes, Gregory Hackett, Randall Gemmen**
Phone: (304)285-4342, Kirk.Gerdes@NETL.DOE.GOV

Utilization of coal as a fuel source for highly efficient integrated gasification fuel cell (IGFC) power generation facilities is technologically and environmentally attractive. IGFC plants are expected to offer the highest efficiency coal gasification processes, even when carbon capture and storage systems are included in the design. One element of IGFC research at the National Energy Technology Laboratory is the investigation of syngas cleanup processes for these integrated systems. Of particular interest are the effects of trace elements naturally contained in the coal and volatilized during the gasification process, and which may be transported to the fuel cell anode. It is important to understand the extent of coal contaminant interaction with the solid-oxide fuel cell anode in order to establish the method and level of contaminant removal in upstream cleaning systems.

This project focuses on the interaction of trace materials contained in coal with the nickel anodes of solid oxide fuel cells. Among the interacting trace elements investigated are arsenic (As), phosphorus (P), sulfur (S), selenium (Se), mercury (Hg), cadmium (Cd), lead (Pb), tin (Sn), zinc (Zn), and antimony (Sb). The effects of higher hydrocarbons including benzene and naphthalene and process chemicals such as Selexol are also considered. Results are reported for laboratory controlled trace material exposure tests and also for field tests on direct coal-derived synthesis gas.