## STUDY OF POSITIVE ELECTRODE AND SEPARATOR FACTORS AFFECTING PERFORMANCE AND LIFE OF LITHIUM/IRON SULFIDE CELLS

*General Motors, Research Laboratories, Warren, MI 48090 (U.S.A.)*

Parametric design studies are being conducted to improve the utilization of the $FeS_2$ electrode in Li–Al/LiCl–KCl/$FeS_2$ cells. The parameters under investigation include: (1) electrode thickness; (2) electrode porosity; (3) current collection; (4) electrolyte composition. The utilization of active material in the $FeS_2$ electrode is determined by observations of the voltage *vs.* time characteristics of small ($<10$ cm$^2$) test electrodes under constant current discharge. The electrode potentials are measured relative to a suitable reference electrode. The effects of current density and temperature are also being evaluated.

The results of the studies to date indicate that (1) a porosity of 30% for the uncharged electrode is near the optimum, (2) an electrode thickness of ~3 mm is near the optimum, and (3) the use of 3 - 4 wt.% Vulcan XC72R graphite powder is near the optimum as a current-collector material. Variations in temperature (400 and 450 °C) and current density (2- and 4-h discharge rates) had only a slight effect on the electrode behavior. Of the three parameters investigated to date, improved current collection had the greatest effect in increasing the utilization of the $FeS_2$ electrode. Studies to evaluate other current collectors and the effect of electrolyte composition are under consideration.

## DEVELOPMENT OF *IN SITU* BORONIZATION PROTECTION OF POSITIVE ELECTRODE CURRENT COLLECTORS

*Institute of Gas Technology, 3424 S. State Street, Chicago, IL 60616 (U.S.A.)*

The concept of *in situ* boronization protection for the positive electrode current collector in lithium/metal sulfide batteries recognizes that corrosion-resistant coatings may be susceptible to corrosion of the substrate *via* defects or pinholes. Boride coatings on low-carbon ferrous materials, although showing excellent initial corrosion resistance for this application, may become more susceptible to corrosion *via* slow diffusion of the boride from the