

(1) LITHIUM-SILICON/IRON SULFIDE BATTERY PROGRAM RESEARCH AND DEVELOPMENT

(2) DESIGN AND COST STUDY FOR THE MARK II LITHIUM ALLOY/IRON SULFIDE ELECTRIC VEHICLE BATTERY

Rockwell International, Energy Systems Group, 8900 DeSoto Avenue, Canoga Park, CA 91304 (U.S.A.)

The objectives of this work are to develop lithium alloy/iron sulfide cells for electric-vehicle and load-leveling batteries and to conduct system design studies on off-peak energy storage plants.

Investigations are being conducted on ceramic powder electrode separators compatible with the molten LiCl-KCl electrolyte and the lithium alloys, Li_xSi and LiAl, at the cell operating temperature (450 °C). Tests of ~2 mm thick AlN powder separators in 120 W h $\text{Li}_x\text{Si}/\text{FeS}$ bicells indicated that fine (≥ 200 mesh) AlN powder provided inadequate support to the electrodes and coarse (60 mesh) powder provided insufficient particle retention within the electrodes. Ion-conductive compositions of Li_3PO_4 and Li_4SiO_4 (-60, +120 mesh) are now being tested in cells with LiAl and Li_xSi negative electrodes.

Conceptual design studies were conducted on a 100 MW h battery plant. Two conceptual cell designs involving capacities of 800 W h and 2.5 kW h, respectively, were selected for intensive study. Preliminary assessments indicate a close approach to the cost goal of \$20 - 25/kW h for the balance of plant cost, exclusive of cells and a.c./d.c. conversion equipment.

A cost and design study was conducted to evaluate the design and production cost of lithium alloy/iron sulfide batteries for electric vehicles. The study was based on battery production rates of 250 and 2000 MW h/yr.

Recent publications

- 1 Rockwell International, Development of lithium-metal sulfide batteries, *EPRI Rep. No. EM-76, Project 116, Project Report No. 4, June, 1978.*
- 2 J. C. Hall, Design and testing of a large-scale lithium-silicon/iron sulfide load-leveling cell, *Proc. 28th Power Sources Symp. Atlantic City, June 12 - 15, 1978, The Electrochemical Society, p. 17.*