NASA TECH BRIEF

Langley Research Center

Battery Cell Thermal-Conductive Coating Increases Efficiency

Applying a thin coating of high-temperature epoxy resin (containing an aluminum-oxide filler) to battery cells provides the necessary electrical insulation, as well as good thermal conductivity between the cells. This insulation increases the efficiency of a nickel-cadmium battery, as it would any multicell battery assembly in which cell-to-cell thermal balance is critical.

With this thermally conductive coating, the efficiency of the battery was 23% greater than with the best alternative method tested. This improvement was obtained even though the primary heat transfer surface was the cell base, which was heat sunk to a plate in the center of the battery. A battery designed for more uniform heat rejection over the cell surfaces should have much greater thermal efficiency.

To prepare battery cells using this method, a thin 0.05- to 0.76-mm (2- to 3-mil) film of high-temperature, aluminum-oxide-filled epoxy resin is applied to each cell, to provide the electrical resistance required to prevent shorting and to provide a thermally conductive path between cells to reduce the temperature difference to 0.6° C (1° F).

The resin used (Stycast 2850FT or equivalent) has a thermal conductance of 14 watt-cm/m^2-K (10 BTU-in./ft^2-hr-°F) and an electrical resistance of 10^{14} ohm-cm. The coating is applied by dipping each cell into the solution that has been heated to 66° C (150° F). The cells are rotated, to maintain a uniform coating thickness, until gel is achieved. Then they are cured for four hours at 74° C (165° F) and for two hours at 100° C (212° F).

Note:

No further documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
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Reference: B73-10237

Patent status:

Inquiries concerning rights for the commercial use of this invention should be addressed to:

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