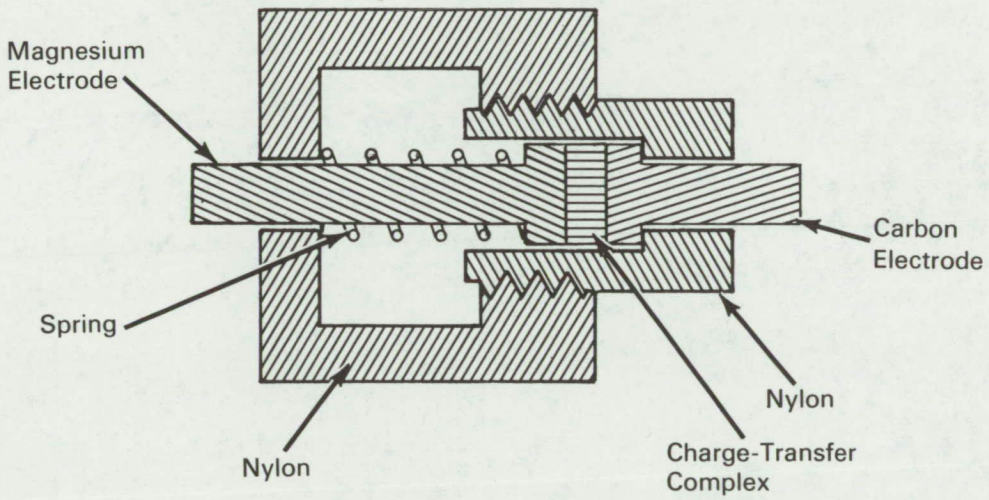
August 1967 Brief 67-10275

NASA TECH BRIEF

Primary Cell Uses Neither Liquid Nor Fused Electrolytes



The problem:

Present miniature battery cells are tightly packed with liquids or liquid containing pastes of a corrosive nature that can seriously damage adjacent electronic components if leakage occurs. These wet electrolytes have been essential for controlled steady conversion of chemical to electrical energy.

The solution:

A dry, solid state device that establishes an electrode reaction by a charge transfer mechanism without liquid phase ionization of electrolyte compounds. The complex is sufficiently conductive to permit the passage of useful current.

How it's done:

A hollow nylon cell block in two parts forms the body of the primary cell. The charge transfer complex, for example, tetracyanoethylene and graphite, is mixed in an inert solvent such as dichloromethane and the solvent removed in high vacuum. The complex is then compacted in a hydraulic press under 100,000 lb/in.^{2} pressure that yields disks of approximately 1/2-in. diameter and 0.04-in. thickness. A magnesium and a carbon electrode are designed with contact faces to match the complex disk, and the three components are enclosed in the two-part nylon cell block with a small spring holding them together in intimate contact as shown in the sketch.

Notes:

1. Open circuit voltages of 1.5 v are obtained at a short-circuit current density of 150 microamps/cm^2. These levels are sufficient to energize a variety of microelectronic circuits or to power capacitor-fired pyrotechnic devices such as squibs or explosive bolts.

(continued overleaf)

2. A related invention is described in NASA Tech Brief B66-10682, December 1966. Inquiries may also be directed to:

Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103
Reference: B67-10275

Patent status:

Title to this invention has been waived under the provisions of the National Aeronautics and Space Act (42 U.S.C. 2457 (f)), to the California Institute of Technology (Attention: T. L. Stam), 1201 East California Street, Pasadena, California 91109.

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