# PREFACE

# SYMPOSIUM ON MATERIALS FOR LARGE SPACE POWER SYSTEMS

Robert J. Teitel / *Douglas Aircraft Company, Inc., Santa Monica, California*

A symposium on "Materials For Large Space Power Systems" was presented at the Washington ANS Annual Meeting in 1965. Most of the papers reported work in progress and appear in the Transaction Summaries[1] published for the meeting. Some of the more complete papers have been gathered and are presented in the following pages.

A principle material requirement for large space power systems is that the systems operate at high temperatures (1500°F and higher). In such systems, the weight and physical size of the radiator needed to dissipate waste heat to space becomes dominant. High radiator operating temperatures are sought to curb weight penalties at lower temperature. The radiator temperature determines the minimum temperature of the power systems and all other parts must operate at even higher temperatures.

The SNAP-50-SPUR Project (now curtailed because no near-term mission requirement could be established) envisioned a Rankine power-conversion system utilizing potassium as a working fluid and operating at 1500 to 1800°F to produce 300 kW of electrical power. A reactor heat source would have been provided by a lithium-cooled reactor operating at about 2000°F with fuel temperatures much higher. A primary waste-heat radiator was to operate at between 1300 to 1500°F. Before the funds were diverted from the project in 1965, the experimental program had moved into component development and showed good promise for accomplishing the objectives of the program.

The impact of technological advances in the use of alkali metals in heat-transport systems and of new refractory alloys for high-temperature operation is yet to be felt in their application in other systems. For example, columbium and tantalum metal were advanced from laboratory curiosities to commercial materials available in many forms and alloys. Lithium and potassium technology also made sharp advances. Now these technologies are being applied to thermionic power systems, isotope power systems, heat pipes, and other systems.

The symposium represents an effort to bring together the technology developed for the SNAP-50-SPUR program. The papers presented touch on practically all facets of the pertinent materials technology above 1500°F.

Organization of the symposium was due to the generous efforts of the following:

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## REFERENCES

1. *Trans. Am. Nucl. Soc.*, 8, 2 (1965).