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August 11, 1992

In reply refer to GO 71033

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Arlington, VA 22217-5000

Attention: Dr. Wallace A. Smith

Subject: Electrodeposition of High Temperature Superconductors"
For period 04/01/92 through 06/30/92
Contract No. N00014-90-C-0225
SC71033.QRDSR

Enclosed please find subject report.

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Attention: Dr. Wallace A. Smith

Subject: Quarterly R&D Status Report No. 7
"Electrodeposition of High Temperature Superconductors"
For period 04/01/92 through 06/30/92
Contract No. N00014-90-C-0225
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PROGRAM SUMMARY

The overall objective of this project is to develop a process for direct electrodeposition of Y-Ba-Cu superconducting oxides from a molten salt at relatively low temperatures (300-550°C). The approach entails establishing a sequence of electrochemical steps for the layered deposition of Y, Ba and Cu oxide species from a eutectic Na-K nitrate melt.

PROGRAM STATUS

No work was performed during this reporting period since the required inert atmosphere glove box had been diverted for use on another project (because of the delay in receiving incremental funding). This equipment is now available for the present program and work is again proceeding.

ACCOMPLISHMENTS

Not applicable.

PROBLEM AREAS

None.

GOALS FOR NEXT REPORTING PERIOD

Future work will focus on developing and evaluating promising schemes for electrodeposition of Y-Ba-Cu HTSC materials. Initial studies will be directed toward evaluating the molten salt electrochemical equivalent of molecular beam epitaxy. In this case, the electrode voltage is maintained just positive of that required for Ba oxide deposition, and monolayer amounts of Cu and Y are injected (by electrodissolution of individual metal electrodes) and electrodeposited in sequence. A cell of very small volume is used to ensure that complete deposition of the injected metal occurs in a short time. Incorporation of Ba oxide layers should occur in proper sequence by underpotential compound formation. This simple straightforward approach will be investigated thoroughly before more complicated deposition schemes are considered.

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Principal Investigator