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Rockwell
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MAY 13 1992
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April 23, 1992

In reply refer to GO 71033

Scientific Officer
Materials Division
Office of Naval Research
800 No. Quincy Street
Arlington, VA 22217-5000

Attention: Wallace Smith

Subject: Electrodeposition of High Temperature Superconductors
Quarterly R&D Status Report #6
for Period 01/01/92 through 03/31/92
Contract No. N00014-90-C-0225
SC71033.QRDSR

Enclosed please find subject report.

ROCKWELL INTERNATIONAL CORP.
Science Center


D. Morgan Tench
Principal Investigator

cs: Director, Advanced Research
Projects Agency
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Arlington, VA 22203-1714
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Arlington, VA 22203
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Statement A per telecon Dr. Wallace Smith
ONR/Code 1131
Arlington, VA 22217-5000

NWW 5/8/92

15 April 1992

In reply refer to G.O. 71033

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800 North Quincy Street
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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 incremental funding had not been received. An application for a no-cost extension of the program to 09/30/92 was submitted. Incremental funding has recently been received.

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

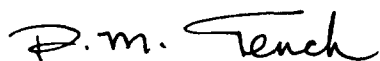
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studies will be directed toward evaluating the molten salt electrochemical equivalent of molecular beam epitaxy. In this case, the electrode voltage is maintained just positive of that required for Ba oxide deposition, and monolayer amounts of Cu and Y are injected (by electro dissolution 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.

Rockwell International Science Center

A handwritten signature in cursive script that reads "D. M. Tench". The letters are fluid and connected, with a prominent loop on the 'T' and a long tail on the 'h'.

D. M. Tench
Principal Investigator