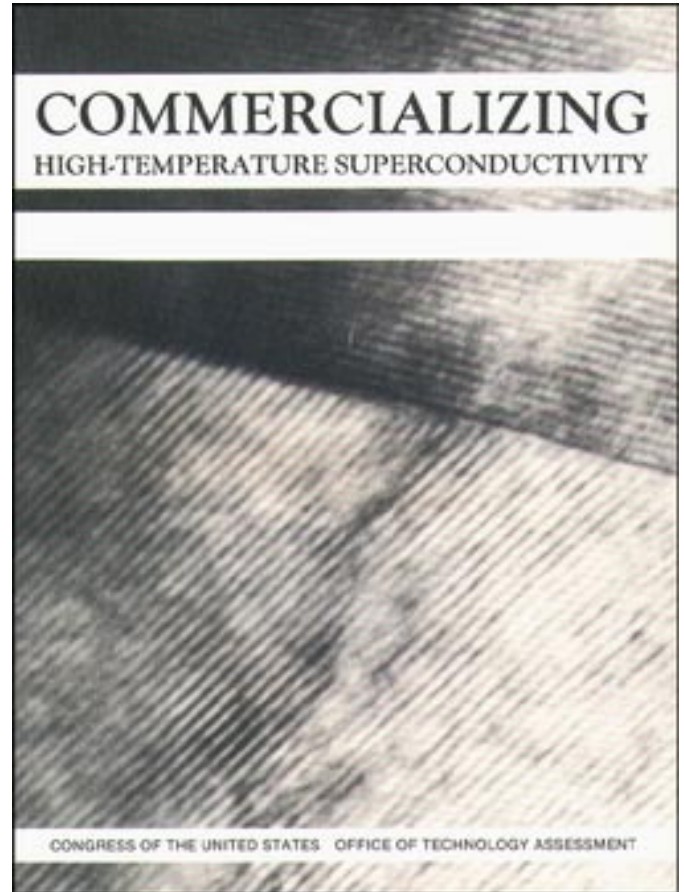


*Commercializing High-Temperature
Superconductivity*

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Foreword

Less than two years ago, superconductivity—total loss of resistance to electricity—could be achieved only at temperatures near absolute zero. Since the discovery of high-temperature superconductivity (HTS), research laboratories around the world have pushed the temperature limits steadily upward, opening the way to commercial applications with potentially revolutionary impacts. The scientific race is becoming a commercial race, one featuring U.S. and Japanese companies, and one that the United States could lose. Indeed, American firms may already be falling behind in commercializing the technology of superconductivity.


Japanese companies have been more aggressive in examining possible applications of HTS, and what it might mean for competitive strategy. While payoffs on R&D may lie a decade or more in the future, managers in Japan have been willing to take the risks. Although a number of U.S. companies have also begun major efforts in HTS, most American managers, under pressure to show short-term profits, have been more inclined to wait and see.

So far, the U.S. Government has supported the development of HTS in its traditional way—by putting money into R&D, mostly through the mission agencies. Federal agencies moved quickly to channel money to HTS when news of the discoveries broke. The breadth and depth of the response in government agencies and Federal laboratories, and in the university system, shows the continuing vitality of the scientific enterprise in the United States. Although Federal dollars will help support a technology base that the private sector can build upon, the U.S. Government is not providing direct support for commercialization. Nor have we any policy or tradition for this kind of support—unlike countries such as Japan.

Postwar U.S. technology policy coupled R&D funding with indirect measures, such as tax policy, to stimulate commercial innovation. So long as American companies remained well ahead of the rest of the world in technical skills and management ability, this approach proved successful. With the continuing decline in competitiveness across many sectors of the U.S. economy, it no longer seems good enough.

The Senate Committees on Governmental Affairs, Energy and Natural Resources, and Commerce, Science, and Transportation, together with the House Committee on Science, Space, and Technology requested the assessment of which this report is part. OTA's Energy and Materials Program is also conducting a more comprehensive examination of the science and technology of high-temperature superconductivity, and the future research agenda, as the second part of this assessment. Their report will appear in 1989.

OTA is grateful for the assistance provided by many people inside and outside of government during the preparation of this report. Full responsibility for the contents rests with OTA.


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