

# PROCESS ECONOMICS PROGRAM

SRI INTERNATIONAL

Menlo Park, California

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## Abstract

Process Economics Program Report No. 196

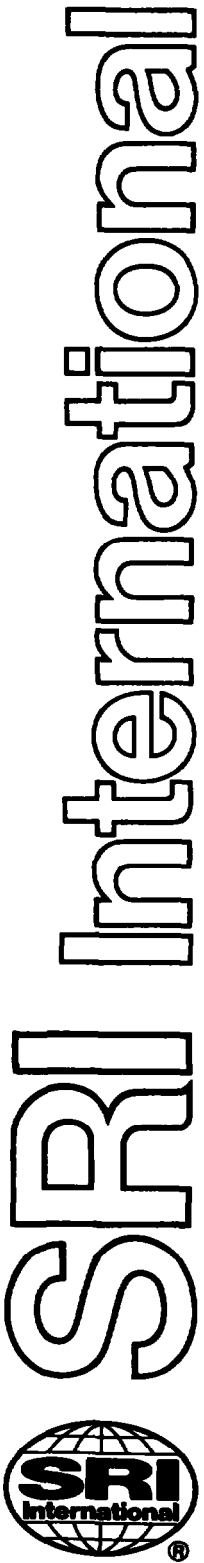
### ADVANCED STRUCTURAL CERAMICS

(September 1989)

This report covers the technologies and economics for the production of high purity, submicron powders for use in the manufacture of advanced structural ceramics. These ceramics are now used in a multitude of high performance products such as tools, dies, bearings, and other similarly engineered components. The greater potential for these materials is for making heat engines, turbomachinery, heat exchangers, chemical machinery, and other applications where high-temperature strength, exceptional hardness, and low thermal and electrical conductivities are required.

To illustrate the economics of making high purity, submicron powders, we have estimated the investment and production costs for manufacturing 1,000 t/yr (2.2 million lb/yr) for each of the following products and processes:

- Silicon nitride from silicon tetrachloride by ammonolysis
- Alumina by an aluminum chloride hexahydrate process
- $\beta$ -silicon carbide by a continuous carbothermic process
- Zirconia by a caustic fusion-oxychloride process.



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# **ADVANCED STRUCTURAL CERAMICS**

by **JAMES J. L. MA**

**September 1989**

A private report by the  
**PROCESS ECONOMICS PROGRAM**

Menlo Park, California 94025

For detailed marketing data and information, the reader is referred to one of the SRI programs specializing in marketing research. The *CHEMICAL ECONOMICS HANDBOOK* Program covers most major chemicals and chemical products produced in the United States and the *WORLD PETROCHEMICALS* Program covers major hydrocarbons and their derivatives on a worldwide basis. In addition, the SRI *DIRECTORY OF CHEMICAL PRODUCERS* services provide detailed lists of chemical producers by company, product, and plant for the United States and Western Europe

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