

## SYMPOSIUM ON CERAMICS IN NUCLEAR ENERGY

## INTRODUCTION

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During recent years the quest for higher operating temperatures in nuclear reactors has stimulated an increasing interest in ceramic materials. The application of these materials in nuclear reactors has been diversified, and ceramic materials have found use as high-temperature corrosion-resistant fuels, high-temperature moderators and control materials, and to a limited extent as structural components of reactors. In each of these areas the application of ceramic materials has been designed to meet specific requirements of a nuclear reactor, and these unique applications have made it difficult to correlate the important properties of ceramics between reactors. Therefore, the development of standards as applied to nuclear ceramics is a difficult task.

To acquaint the membership of the Society as well as the general public with the diverse application of ceramic materials in nuclear energy, the present symposium was initiated. In the initial planning, considerable effort was expended to avoid an extensive coverage of one specific area of application. Thus the general objectives of the symposium were formulated to:

1. Promote a better understanding of the wide area in which ceramic materials are used in nuclear reactors,

2. Provide leadership for a discussion forum so that theoretical premises as well as experimental data could be reviewed, and perhaps promote a better understanding of individual problems, and

3. Through discussion formulate areas of agreement and disagreement, and thus find common ground for the development of standards; and highlight areas requiring additional study.

In line with this general policy speakers were selected from among men of recognized knowledge in the various fields, and these men were designated to stimulate discussion concerning specific areas of application.

To introduce the use of ceramic materials for nuclear fuels, M. J. Snyder discusses the preparation and properties of some refractory compounds of uranium. These compounds represent materials which are of current interest, and may have potential application as fuels. However, a general lack of knowledge concerning the properties of many of these compounds has hindered their development. The fabrication of nuclear fuels is discussed in papers presented by F. J. Hartwig, G. L. Ploetz,<sup>2</sup> and L. G. Wisnyi. While descriptive of specific fuels, these fabrication papers outline the typical manufacturing problems associated with radioactive materials. The use of graphite as a high-temperature moderator is presented in the papers by K. M. Taylor and W. C. Riley. In these applications the

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<sup>2</sup> Not included in this publication.

graphite serves as a matrix for the uranium fuel. The use of oxide fuel as the dispersed phase is also discussed by R. A. Noland. In this paper the matrix of the fuel is aluminum in which  $U_3O_8$  is dispersed. This fuel, while not a high-temperature fuel, indicates the wide use of uranium oxide in nuclear energy.

This then is the general introduction

to the application of ceramic materials to nuclear energy. It is hoped that the efforts of men who served on this symposium will be effective in promoting a better understanding of the problems involved, and that through their efforts the achievement of nuclear reactors operating at high temperatures may some day be realized.