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The view, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation.

12a. DISTRIBUTION / AVAILABILITY STATEMENT

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13. ABSTRACT (Maximum 200 words)

The considerable interest in using ceramics for structural applications is constrained in large part by the difficulty in forming ceramics in useful component shapes. Superplasticity, a term referring to the ability of some fine grained crystalline materials to deform extensively, is being used commercially to form metallic components with complex shapes. It may be possible to use this phenomenon to form structural ceramics. This proposal outlines a three year, detailed, fundamental research program to investigate processing and mechanical properties of fine grained structural superplastic ceramics with the appropriate characterization. We will use an alkoxide synthesis technique to process the structural ceramics, and evaluate the high temperature mechanical properties in both tension and compression. The microstructural aspects of superplastic deformation and cavitation failure will be examined using x-ray diffraction, optical, scanning electron and transmission electron microscopy. It is anticipated that the present experimental study will substantially improve the understanding of superplasticity in structural ceramics, and this is likely to enhance the prospects of using this phenomenon for forming ceramics.

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FINAL REPORT

The three year contract was terminated at the end of the first year because of funding limitations at ARO. The publications resulting from the initial ARO support essentially constitute the final report of this project. The results obtained from the ARO contract #DAAL03-89-K-0145 have now been published in various scientific journals as listed below:

- (1) A.H. Chokshi, J. Mater. Sci. 25, 3221-3228 (1990).
- (2) A.H. Chokshi, A. Rosen, J. Karch and H. Gleiter, Scripta Metall. 23, 1679-1684 (1989).
- (3) A.H. Chokshi, Proc. 4th Inter. Conf. Creep and Fracture of Engineering Materials and Structures (swansea, U.K.), pp. 189-197 (1990).
- (4) A.H. Chokshi and M.A. Meyers, Scripta Metall. 24, 605-610 (1990).
- (5) A.H. Chokshi, D.J. Schissier, T.-G. Nieh and J. Wadsworth, MRS Symp. Proc. 196, pp. 379-384 (1990).
- (6) A.H. Chokshi, in High Performance Composites for the 1990's (TMS), pp. 93-104 (1991).
- (7) A.H. Chokshi, T.-G. Nieh and J. Wadsworth, J. Am. Ceram. Soc. 74, 869-873 (1991).
- (8) D.J. Schissler, A.H. Chokshi, T.G. Nieh and J. Wadsworth, Acta Metall. Mater. 39, 3227-3236 (1991).

A copy of each of the papers is enclosed with this report.

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