

POTENTIAL APPLICATIONS OF METALLIC GLASSES

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Abstract: Metallic Glasses are considered to be the materials of the future. These new materials are said to be stronger and much springier than the best industrial steel. This article presents a short review of metallic glasses: the general knowledge, the history and methods of preparation of metallic glasses, the remarkable properties along with potential applications and problems exist in studying of these new materials.

Keywords: Glasses, metallic, non-crystalline solid, elastic, strength.

1. INTRODUCTION

Mention "glass", and a window pane comes to mind. To scientists, a glass is any material that can be cooled from a liquid to a solid without crystallizing. Most metals crystallize as they cool, arranging their atoms into a highly regular spatial pattern called a lattice. But if crystallization does not occur, and the atoms settle into a nearly random arrangement, the final form is a metallic glass. Unlike common glasses, such as window glass, which are typically electrical insulators, metallic glasses have good electrical conductivity. With no crystal defects, metallic glasses have a lot of remarkable properties, which promise a lot of applications in engineering. However, study of the structure and study how to create a metallic glass with a large size is a challenge for scientists. Thus, although the first successful fabrication of metallic glasses was done more than 50 years ago, these materials still have a very large attractiveness in science and engineering. The objective of this article is to introduce the general knowledge, the problems have not been resolved and the potential applications of these new materials.

2. HISTORY OF METALLIC GLASSES

How to create a metallic glass? The answer is to give the metal atoms not the slightest chance to form a crystal. This means to cool the material superfast. The formation of the first metallic glass of $\text{Au}_{80}\text{Si}_{20}$ was reported by Duwez and co-workers at the California Institute of Technology in 1960 [1]. Rapidly quenching a $\text{Au}_{80}\text{Si}_{20}$ alloy, using "splat-cooling" to

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Supercooled Liquids, Glass Transition and Bulk Metallic Glasses: Volume 754 Takeshi Egami, 2003-07-16 There has been a renaissance in glass science brought about by the development of concepts such as fragility index and the energy landscape with megabasins Research on bulk metallic glasses has been explosive since their advent when MRS offered its first book on the topic In 2000 a second book broadened the scope to include supercooled liquid bulk glassy and nanocrystalline states This book enhances the scope to include glass transition in diverse materials such as water silicate and polymeric melts Bringing these threads together in an interdisciplinary manner was fruitful and offers proof that while there is much common ground gaps between various approaches to the glassy state remain to be bridged Subjects include the supercooled liquid glass formability structural relaxation and dynamics structure determination and modeling processing and applications of bulk metallic glasses mechanical properties mechanical properties composites crystallization electronic and magnetic structure and properties and nanoparticles and nonmetallic glasses *Rapidly Quenched Metals* 6 R.W. Cochrane, 1988-01-01 *Rapidly Quenched Metals* 6 Volume 1 covers the proceedings of the Sixth International Conference on Rapidly Quenched Metals held at Le Centre Sheraton Montreal Canada from August 3 to 7 1987 The said conference discusses a wide variety of topics in the field of rapidly solidified metals The book is divided into two parts Part 1 covers topics that involve the formation and transformation in metallic materials amorphous metals the applications of mechanical alloying and rapid melting and quenching Part 2 discusses the formation and structure of amorphous alloys which includes topics such as the metastability of amorphous phases amorphous alloy powders and studies about the properties of different amorphous alloys The text is recommended for those involved in materials science and metallurgy especially those studying rapidly solidified metals and amorphous alloys *Rapidly Quenched Metals 6: Volume 3* R.W. Cochrane, 1988-01-01 *Rapidly Quenched Metals* 6 Volume 3 **Metallic Glasses**, 1978 *NASA Technical Paper*, 1982 **Papers Submitted to the National Symposium on Physics of Amorphous Materials, May 30-31, 1981** Al Nicula, S. Simon, 1981 **Papers and Discussions Presented Before the [Coal] Division** American Institute of Mining, Metallurgical, and Petroleum Engineers, 1927 *Metals Abstracts*, 1998-04 *The American Stationer*, 1890 **Metallic Glasses** American Society for Metals. Materials Science Division, 1978 **Chemical News and Journal of Physical Science**, 1890 **The Illinois Medical Journal**, 1916 *The Glass Industry*, 1929 **Index to Scientific & Technical Proceedings**, 1979-07 Monthly with annual cumulation Published conference literature useful both as current awareness and retrospective tools that allow searching by authors of individual papers as well as by editors Includes proceedings in all formats i e books reports journal issues etc Complete bibliographical information for each conference proceedings appears in section titled Contents of proceedings with accompanying category permutterm subject sponsor author editor meeting location and corporate indexes Contains abbreviations used in organizational and geographical names *Paper Accepted for Presentation at the 7th*

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