

# Fe Based Bulk Metallic Glasses: The Ultimate Guide

Fe based bulk metallic glasses (BMGs) are a new class of materials with unique properties that make them ideal for a wide range of applications. BMGs are amorphous, meaning they lack the long-range Free Download of crystalline materials. This gives them a number of advantages over crystalline materials, including:



## Fe-Based Bulk Metallic Glasses: Understanding the Influence of Impurities on Glass Formation (MatWerk)

★★★★★ 5 out of 5

Language : English

File size : 12586 KB

Print length: 143 pages



\* High strength and hardness \* Good wear resistance \* Corrosion resistance \* Magnetic properties

These properties make Fe based BMGs ideal for a variety of applications, including:

\* Aerospace \* Automotive \* Medical \* Sporting goods

## Properties of Fe Based BMGs

Fe based BMGs are typically composed of iron, carbon, and one or more other elements. The most common alloying elements include boron, silicon,

and phosphorus. The composition of an Fe based BMG can be tailored to achieve a specific set of properties.

The properties of Fe based BMGs are determined by their amorphous structure. The lack of long-range order in BMGs gives them a number of unique properties, including:

- \* High strength and hardness: BMGs are typically stronger and harder than crystalline materials. This is due to the fact that there are no grain boundaries in BMGs, which are a common source of weakness in crystalline materials.
- \* Good wear resistance: BMGs have good wear resistance due to their high hardness and strength. This makes them ideal for applications where wear is a concern, such as cutting tools and bearings.
- \* Corrosion resistance: BMGs are corrosion resistant due to their amorphous structure. The lack of grain boundaries in BMGs makes them less susceptible to corrosion than crystalline materials.
- \* Magnetic properties: Fe based BMGs are magnetic due to the presence of iron in their composition. The magnetic properties of Fe based BMGs can be tailored by adjusting the composition of the alloy.

## **Processing of Fe Based BMGs**

Fe based BMGs are typically produced by melt-spinning. In this process, a molten alloy is rapidly cooled by spinning it onto a rapidly rotating wheel. This rapid cooling prevents the alloy from crystallizing, resulting in an amorphous structure.

Melt-spinning is a relatively simple and inexpensive process, which makes Fe based BMGs a cost-effective alternative to crystalline materials.

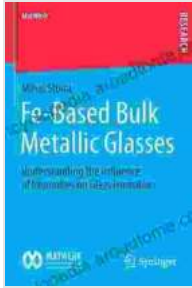
## Applications of Fe Based BMGs

Fe based BMGs have a wide range of potential applications due to their unique properties. Some of the most promising applications for Fe based BMGs include:

\* Aerospace: Fe based BMGs are being investigated for use in a variety of aerospace applications, such as aircraft skins, engine components, and landing gear. Their high strength, hardness, and wear resistance make them ideal for these applications. \* Automotive: Fe based BMGs are also being investigated for use in a variety of automotive applications, such as gears, bearings, and suspension components. Their high strength, hardness, and wear resistance make them ideal for these applications. \* Medical: Fe based BMGs are being investigated for use in a variety of medical applications, such as surgical instruments, implants, and prosthetics. Their corrosion resistance and magnetic properties make them ideal for these applications. \* Sporting goods: Fe based BMGs are being investigated for use in a variety of sporting goods, such as golf clubs, tennis rackets, and baseball bats. Their high strength, hardness, and wear resistance make them ideal for these applications.

Fe based bulk metallic glasses are a new class of materials with unique properties that make them ideal for a wide range of applications. Their high strength, hardness, wear resistance, corrosion resistance, and magnetic properties make them a promising alternative to crystalline materials in a variety of applications.

As research into Fe based BMGs continues, new applications for these materials are being discovered. It is likely that Fe based BMGs will play an increasingly important role in a variety of industries in the years to come.



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