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BULK METALLIC GLASSES

The main theme of this topic is a realization of a superiority of amorphous metals and need of improving our knowledge about them.

We would like to start by describing the definition of BMGs. Bulk metallic glasses are thick layer materials made of amorphous metals, which means they have unstable structure. But how can we get this structure? Only different alloy systems can allow us to get amorphous structure when we will cool down such system. Because solids, when they are heated lose crystal shell so atoms can move freely and if temperature gradually decreases we have crystal shell but if the temperature decreases very fast, atoms can't get back to the previous form and create crystal shell, that's how BMGs are created. Also, when BMGs are heated they become very plastic so we can give them any shape is needed.

With such construction metal gains strength, corrosion resistance, conduction, durability bigger than most metals can possibly achieve. But with these advantages, one problem appears: this kind of metals is hard to treat, that fact limits the ability of their using.

Experiments with tension showed, that metal glasses, despite the fact, that they are dominating, still can't withstand long-term forces applied (fatigue failure).

Where can BMGs be used? As applications, it is possible to mention golf clubs, knives, bridges, tennis rackets, various shaped mirrors, the casing of fragile things, vessels for soldering, airplane cover, antenna material, biomedical instruments, etc.

Most popular element for creating BMG alloys are zirconium, niobium, cuprum, lithium, nickel, iron, chrome, etc. Amorphization decreases with increasing Zr content in the powder blend.

Nowadays, scientists all over the world are working on creating a thicker BMG alloy, which human beings will use in their future life.

However, BMGs are very expensive materials commonly because they're made of expensive elements such as palladium and zirconium, and youth of this field of study as well.

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