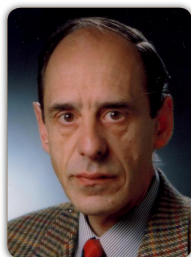


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Herbert Gleiter

*Karlsruhe Institute of Technology - KIT, Germany**Nanjing University of Science and Technology, China*

Nano-glasses: A new kind of non-crystalline solids with new applications in technology and medicine

Today's technologies are based primarily on utilizing crystalline materials such as metals, semiconductors or crystalline ceramics. The way to a new world of technologies based on non-crystalline materials may be opened by means of nano-glasses. Nano-glasses consist of nanometer-sized glassy regions connected by (nanometer-wide) interfacial regions with atomic and electronic structures that do not exist in melt-cooled glasses. If the size of the nanometer-sized glassy regions is 5 nm or less the volume fraction of these interfacial regions is 50% or above. Due to their new atomic/electronic structures, the properties of nano-glass differ from the corresponding properties of melt-cooled glasses. For example, FeSc nano-glasses were (at 300K) strong ferro-magnets although the corresponding melt-cooled glasses were paramagnetic. Similarly, the ductility, the biocompatibility, the catalytic properties of nano-glasses were improved by up to several orders of magnitude. Moreover, nano-glasses open the way to new kinds of alloys as they permit the alloying of components that are immiscible in crystalline materials.

Just like in the case of crystalline materials, the properties of which may be changed by varying the sizes and/or chemical compositions of the crystallites, the properties of nano-glasses may be controlled by varying the sizes and/or chemical compositions of the glassy clusters. This analogy opens the perspective that a new age of technologies - a "glass age" - may be initiated by utilizing the new properties of nano-glasses and modifying their properties by varying the sizes and/or chemical compositions of the glassy clusters.

Biography

Herbert Gleiter received his PhD in Physics. In 1973, Gleiter became Chair Professor of Materials Science and founded in 1988 today's Leibniz Institute of New Materials at Saarbruecken, Germany. In 1994, he was appointed Member of the Executive Board of the Research Center Karlsruhe, Germany, and 4 years later he became the Founding Director of the Center's Institute of Nanotechnology. In 2012 the Chinese Academy of Sciences and the University of Nanjing founded the "Herbert Gleiter Institute of Nanoscience" and appointed him as the Institute's Founding Director.

Prof. Gleiter's received more than 40 prizes, seven universities awarded him honorary doctorates. He is a Member of 12 National Academies of Science and/or Engineering

In the late 70's he opened the way to a new kind of materials, called today nano-crystalline materials and more recently, he initiated the new field of nano-glasses. It is the attractive perspective of these nano-glasses that they have the potential to provide the basis a new world of glass based technologies.