Research on Fe-based amorphous alloys with high-Fe content and excellent soft magnetic property

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Iron based amorphous alloys (AAs) or metallic glasses (MGs) possess not only superior mechanical and anti-corrosion properties but also excellent soft magnetic property, which have attracted many attentions from both scientists and engineers. When used as magnetic materials, the Fe-based amorphous alloys are required to possess high saturation magnetization, which is closely related to the iron content. However, it is very difficult to prepare Fe-based AAs with high iron content due to their low glass-forming ability. As a result, only few Fe-based bulk amorphous alloys (BAAs) with Fe content close to 80 at% have been reported up to date. Then developing Fe-based BAAs with high Fe content and good soft magnetic property is meaningful. Recently, the effects of alloying elements and processing techniques on the glass-forming ability and the magnetic property of the high Fe content alloys have been studied in our group. It shows suitable alloying could significantly enhance the glass-forming ability of the high Fe content alloys. The Fe-based bulk amorphous alloys with the Fe content (or total magnetic elements content) of 80-82 at% have been successfully developed. In addition, these Fe-based bulk amorphous alloys exhibit good mechanical property and excellent soft magnetic property. Their saturated magnetic flux density (Bs) is about 1.60-1.65T. The present results indicate that it is possible to enhance the glass-forming ability and magnetic property of high Fe content alloys and develop high performance Fe-based BAAs.

Biography

Ke-Fu Yao has his expertise in Developing Bulk Metallic Glasses and understanding their mechanical behavior and functional property. He developed a series of Pd-based bulk glassy alloys, Ti-based bulk glassy alloys, Fe-based glassy alloys and High-entropy glassy alloys with good glass-forming ability. He evidenced that some bulk metallic glasses could exhibit large compressive plasticity and good Magnetic property. He developed several methods for processing the amorphous alloys and improving their mechanical and functional properties.

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