developed product

Fe-Ga Magnetostrictive Alloy Single Crystals

Sumitomo Metal Mining has a long history of producing and selling crystal material products,
with expertise in high-quality crystal growth and precision processing.
Leveraging this expertise, we have developed manufacturing technology for Fe-Ga magnetostrictive alloy single crystals.
These crystals offer high and stable magnetostrictive performance along with metal durability,
making them ideal for magnetostrictive vibration power generation for IoT, vibration sensors, and other potential applications.

Advantage

☑ Crystal Growth: Vertical Bridgman (VB) Method (Figure 1)

SMM has traditionally employed the Czochralski (Cz) method for crystal growth. For our new product, the "Fe-Ga Magnetostrictive Alloy", we use the Vertical Bridgman (VB) method to grow single crystals. In the Cz method, the grown crystal is rotated in the crucible, causing the melt to be stirred. In contrast, the VB method suppresses melt stirring because there is no crystal rotation, which helps to minimize compositional variations within the grown crystal.

☑ Reduced Processing Losses by Growing Quadrangular Prismatic Crystals (Figure 2)

Quadrangular prismatic shapes up to 66 mm x 66 mm and cylindrical shapes up to ϕ52mm

☑ Achieving Stable Magnetostriction of 300ppm by Controlling Ga Composition to 17-19at.% (Figures 3, 4)

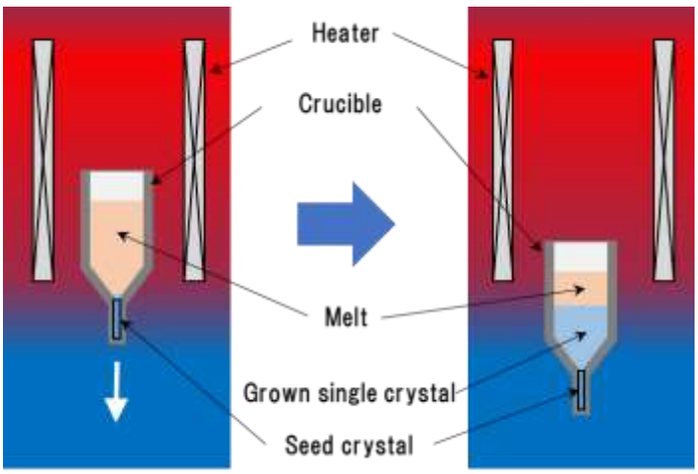


Figure 1 Schematic diagram of the VB method

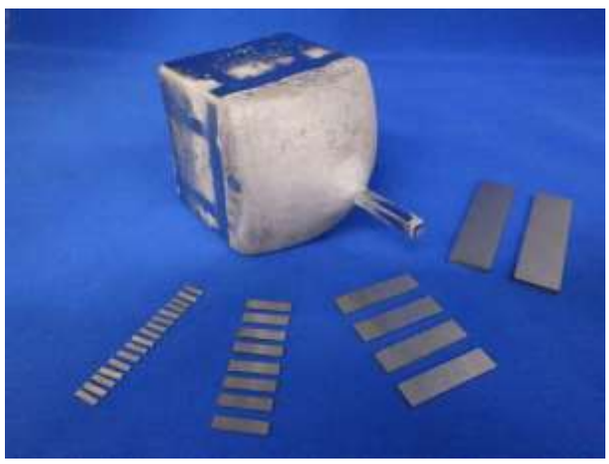


Figure 2 2.6-inch □ square prismatic crystals and fabricated sheet

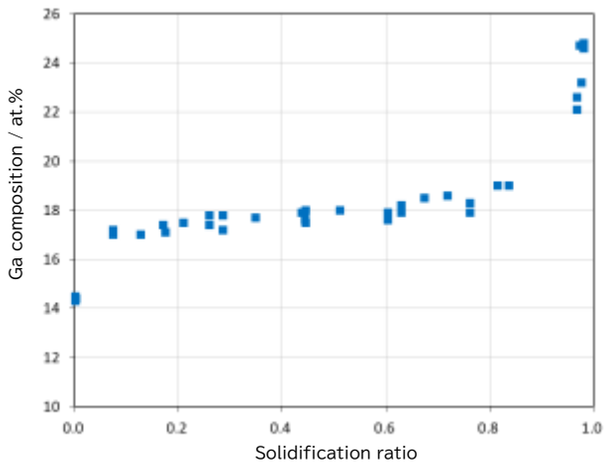


Figure 3 Relationship between Solidification ratio and Ga composition

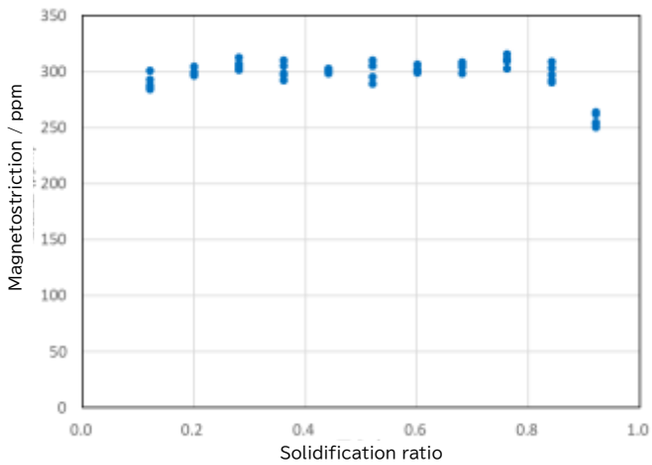


Figure 4 Relationship between Solidification ratio and Magnetostriction

- The solidification ratio indicates the ratio of the solidification weight to the raw material filling amount.
- Ga composition is evaluated by ICP analysis.
- Magnetostriction is measured by applying a magnetic field of 2000 Oe using the strain gauge method.

<Notes>
※This product is under development.
※The values in the graph are representative values, not guaranteed values and are subject to change.

If you have any question about this product,
please feel free to contact us.
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