T17-105

Tohoku University's Invention

Oxide dispersion strengthened alloys

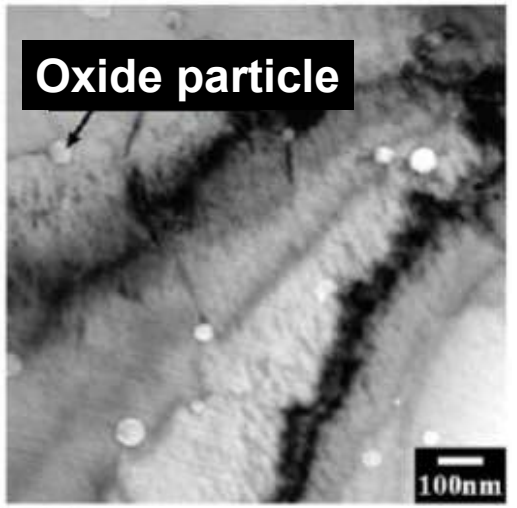
Oxide dispersion strengthened alloys with uniform dispersion of fine oxide particles can be fabricated by the additive manufacturing method!

Summary

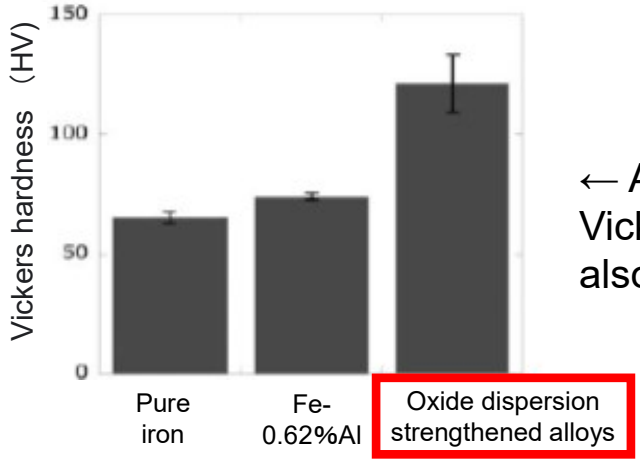
Oxide dispersion strengthened alloy is an alloy where the hard oxide particles are dispersed inside the crystal grains of the metal matrix. By having more oxide particles inside the crystal grains of the matrix phase with uniform dispersion, it is difficult for the oxide particles to agglomerate or coarse even when exposed to a high-temperature environment for a long period of time, which makes difficult for the material to deteriorate its strength property.

In the casting method, metallic liquid and oxide solids having different density are difficult to mix homogeneously, and oxide particles are pushed by the solid-liquid interface of solidification and agglomerate in the final solidified part, which prevents them from being uniformly dispersed in the matrix. In addition, the laser and electron beam additive manufacturing methods involve the powder particles melting process which causes the agglomeration of fine oxide particles and makes it difficult to disperse them uniformly inside the matrix.

This invention solves the above problem and provides a technology that can fabricate oxide dispersion strengthened alloys with fine oxide particles uniformly dispersed inside the crystal grains of the matrix phase when using the additive manufacturing method.



← Fine oxide particles are dispersed inside the crystal grains of the matrix phase.



← As a result, Vickers hardness also increased

Application

- Any complex shape parts that are expected to be used at high temperature

Patent Data Sheet

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